THE VALUE OF MEDICAL THORACOSCOPY DONE AT THE GOVERNMENT HOSPITAL OF THORACIC MEDICINE, TAMBARAM SANATORIUM; IN CASES OF HEMORRHAGIC PLEURAL EFFUSIONS

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CERTIFICATE

This is to certify that the dissertation on **"THE VALUE OF MEDICAL THORACOSCOPY DONE AT THE GOVERNMENT HOSPITAL OF THORACIC MEDICINE, TAMBARAM SANATORIUM; IN CASES OF HEMORRHAGIC PLEURAL EFFUSIONS"** is a record of research work done by DR.C.CHELLARAJA in partial fulfilment for M.D.(TUBERCULOSIS AND RESPIRATORY DISEASES / PULMONARY MEDICINE) Examination of the Tamilnadu Dr.M.G.R. Medical University to be held in April 2013.The period of study is from May 2011 to April 2012.

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DECLARATION

I hereby declare that the dissertation **"THE VALUE OF MEDICAL THORACOSCOPY DONE AT THE GOVERNMENT HOSPITAL OF THORACIC MEDICINE, TAMBARAM SANATORIUM;IN CASES OF HEMORRHAGIC PLEURAL EFFUSIONS"** submitted for the Degree of Doctor of Medicine in M.D., Degree Examination, Branch XVII ,M.D.(TUBERCULOSIS AND RESPIRATORY DISEASES / PULMONARY MEDICINE)is my original work and this dissertation was not a basis for award of any degree, diploma, associate ship, fellowship or other titles. It had not been submitted to any other university or Institution for the award of any degree or diploma.

Place: Chennai Signature of the Scholar

Date :

[Dr.C.Chellaraja]

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CONTENTS

INTRODUCTION

THORACOSCOPY OR MEDICAL PLEUROSCOPY:

The technique of medical thoracoscopy (or pleuroscopy) involves passing an endoscope through the thoracic cage and allows direct visualization and biopsies from the pleura. It is both a diagnostic and therapeutic procedure.

Pleural fluid analysis, blind pleural biopsy, transthoracic needle aspiration are not always able to achieve a diagnosis in all cases. It is in this context that medical pleuroscopy or thoracoscopy is useful since the pleurae can be visualized and adequate sampling can be done.

HEMORRHAGIC OR BLOOD TINGED EFFUSIONS:

More than 15% of transudative and more than 40% of all types of exudative pleural fluids are blood tinged which means they have pleural fluid RBC counts between 5,000 and 100,000/mm^3. Hemorrhagic pleural effusions are considered to be secondary to malignancy unless otherwise proved.

In this study all patients who had hemorrhagic pleural effusions and underwent a thoracoscopy between May 2011 and April 2012 were analysed. The demographic, clinical, radiological, per operative findings and the final diagnosis were studied and the value of medical thoracoscopy in hemorrhagic effusions was assessed and reported.

THE GOVERNMENT HOSPITAL OF THORACIC MEDICINE, TAMBARAM SANATORIUM, CHENNAI:

The government hospital of thoracic medicine at Tambaram sanatorium is a tertiary care referral centre located in Chennai, Tamilnadu. It is an apex centre for the diagnosis and treatment of respiratory diseases including tuberculosis. It is attached to Stanley medical college, Chennai and is a postgraduate teaching centre.

This hospital has around 776 beds. There are thirty one in-patient wards. The outpatient department receives around one thousand patients [main OPD and HIV OPD] daily. It is one of the biggest AIDS care centre in the country with around three hundred HIV patients visiting the separate HIV OP department daily. Another three hundred patients take in-patient treatment in eight exclusive HIV wards.

Govt. hospital of thoracic medicine – entrance view.

Govt. Hospital of Thoracic Medicine - a ward

This hospital provides good care and support to all types of chest diseases.

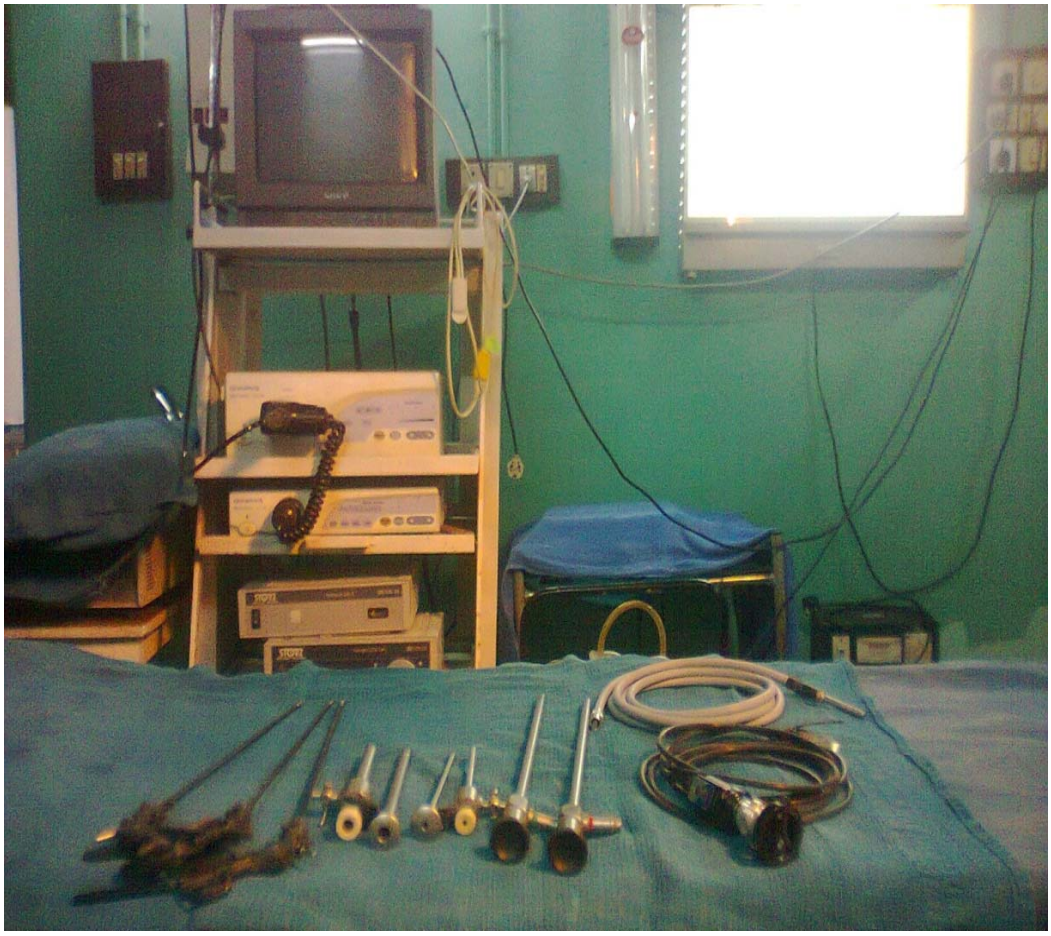
Medical thoracoscopy is being done in government hospital of thoracic medicine for past 4 years. It is done in the fully functional operation theatre as per guidelines.

Patients with pleural effusions are a common occurrence in this hospital. Diagnosing the underlying causes of pleural effusions is mandatory for appropriate treatment. Though tubercular effusions are the most common cause in our set up, other causes of effusions have to be ruled out before initiating anti-tubercular treatment.

Medical thoracoscopy is usually done in cases where prior diagnostic modalities have been unable to provide a definitive diagnosis. The usual investigations done for a case of pleural effusion are:

- Chest x ray –PA view
- Ultrasound chest
- Diagnostic pleural tap

    - Pleural fluid protein, glucose, Lactate Dehydrogenase levels,



Thoracoscopy Instruments.

- p H
- Pleural fluid cell count
- Pleural fluid cytology
- Pleural fluid Adenosine Deaminase levels

- Blind pleural biopsy – Abram's or Cope's needle
- Contrast enhanced computed tomography scan
- Fibre optic bronchoscopy – if there is ipsilateral shift of mediastinum.
- Medical thoracoscopy or pleuroscopy.

Usually hemorrhagic or blood stained pleural effusions are considered malignant effusions unless otherwise proved not so. In accordance with this thought this study was designed to analyse the causes of hemorrhagic pleural effusions that were encountered during the routine diagnostic tapping.

There are proven criteria for classifying exudative and transudative effusions. It was also planned as a part of the study design to formulate certain criteria for hemorrhagic effusions. Based on these criteria

patients were accrued in to the study after the procedure of routine pleural tapping.

Medical thoracoscopy involves the use of costly and technically advanced equipments and is widely known as a safe and effective means of obtaining specimens for histopathological examination by directly viewing both the pleural surfaces.

This hospital is one of the very few centres in the state of Tamilnadu where medical thoracoscopy is available and is being done routinely in the selected patient subsets. By doing this study it would be possible to ascertain whether thoracoscopy can be taken up as the very next step after diagnostic pleural tapping when the pleural fluid is hemorrhagic.

Though this is possible in tertiary care centres, it will probably lead to an early diagnosis of the underlying cause of effusion. This is what prompted me to take up this particular issue and to try and come out with a breakup of the causes of hemorrhagic pleural effusions in our hospital.

The following are the guidelines issued by the British thoracic society for medical thoracoscopy under local anaesthesia:-

1. Place where the procedure can be performed -

Medical thoracoscopy can be performed in an operating theatre, endoscopy suite or clean treatment room, based on the availability of resources.

The room must have the following:

- Table: basic operating table with height adjustment.
- Oxygen source and suction equipment.
- pulse oximetry,
- blood pressure recording
- ECG monitoring.
- resuscitation facilities.
- instrument trolley.
- Chest x ray lobby

2. Personnel -

- One trained respiratory physician
- two other staff – one nurse and one trained worker

3. Instruments -

- rigid thoracoscope with a cold light source- zero degree straight viewing and fifty degree side viewing scopes with 7 millimetre diameter

- trocar and cannula seven millimetre diameter and 10 centimetres in length- cone shaped tip is preferable to triangular tipped ones
- another trocar and cannula with five millimetre diameter and 10 cms length
- biopsy forceps- five millimetre – either optical or direct vision type
- swab holder
- boutin or verres needle – for induction of pneumothorax.
- Talc insufflators if pleurodesis is part of the planned procedure
- Light source – preferably four hundred watts

- Video apparatus
- A camera to take photographs if needed
- Sterile gloves, caps,
- Sterile needles, syringes
- Scalpel, needle holder, scissor,sutures,dressing materials
- Intercostals drainage tube with underwater seal

4. Pre-procedure assessment and care

a. Care Pathway, Patient Information and Consent:

- A standard protocol for assessment should be followed
- patient information leaflet should be given to the patient prior to obtaining consent
- Fully informed consent should be obtained.

b. Pre-operative Investigations:

- complete blood count,
- platelet count,
- coagulation profile,
- serum electrolytes,
- renal function tests
- blood glucose.
- ABG.

- chest X ray
- CT scan is required.
- Pre-procedure ultrasound

c. Pre-operative Fasting:

- Recommended duration of fasting is six-hours prior to procedure.

d. Pre-operative measurements:

- Temperature
- Pulse rate
- blood pressure
- respiratory rate
- oxygen saturations
- ECG
- i.v cannula - in the hand on the same side as the planned procedure.

e. Pre-medication:

- Ibuprofen 800 milligram orally 1 hr before surgery
- Opiods

f. Prophylactic antibiotics:

- One dose of amoxicillin –clavulanic acid 1.2 mg I.V just before procedure

g. Anticoagulants and heparin prophylaxis:

- Oral anticoagulants should be stopped 1 week before surgery.
- LMWH after starting procedure is advised.

5. Positioning, Local Anaesthesia and Sedation

a. Positioning and monitoring:

- Lateral position with side of interest
- Head kept on a soft rest with hands folded before face
- A pillow is kept below chest
- O2 saturation should be kept above 92%

b. Skin should be wiped with alcohol based sterilising solution

c. Sedation used is midazolam 1 to 5 milligram slowly.

Alternatively fentanyl 50 to 100 micrograms can be used

d. Site of incision is 4^{th} or 5^{th} intercostal space .upto twenty ml of 1 % lidocaine can be used.

e. Incision size is 1 centimetre along the direction of ribs

f. A pneumothorax is induced if there is no adequate pleural space.

6. Visualisation of the pleural space and pleural biopsy

- Pleural biopsy is taken from parietal surface only. Fentanyl can be used just before taking a biopsy

  'Lift and peel' technique is used for biopsy
- Minimum of four to five samples are to be taken
- A second port is needed to take biopsies from difficult to reach sites.

7. Interventional procedures

- Pleurodesis can be done by talc insufflations
- Adhesiolysis
- Sympathectomy

8. ICD – 28 to 32 F size is inserted

9. Post-thoracoscopy care –

If lung does not expand in 24 hours ,gentle suction to tube can be applied. ICD tube is removed if drain is less than 150 ml per day. Chest X ray is taken 1 day after thoracoscopy. Opiods are recommended for post operative pain relief.

10. Patients are generally advised to stay for 24 hours post procedure.

11. Patients are then to be registered for regular follow up

LITERATURE REVIEW

HISTORY:

Thoracoscopy was developed by **Hans Christian Jacobaeus** in the early 1900s .Thoracoscopy was used initially extensively for creating artificial pneumothorax in tuberculosis cases. Later thoracoscopy was used primarily to assist in diagnosing pleural effusions and for pleurodesis talc or silver nitrate.

There have been many advances in endoscopic technology leading to great developments in thoracoscopy now. The development of the *charged coupling device* [CCD] and a silicon chip that is light sensitive actually led to sufficient miniaturization of a video camera.

When attached to a fiber-optic telescope, the video camera produces a well-defined and magnified image on a video monitor that allows the operating surgeon to view the area of interest with precision and to take the help of an assistant. Previously, the surgeon had to hold the thoracoscope; into which only he could look while working. This did not

allow for the aid of an assistant and therefore, limited the complexity of the procedures done.

PROCEDURE:

There are two techniques by which medical thoracoscopy can be performed. They are- single puncture and double puncture technique. Both techniques use a xenon light source. For the single puncture technique, a rigid thoracoscope with a 9-mm working channel is used.

Various instruments such as the biopsy forceps, needle biopsy, and suction catheter are used through the working channel, which can also accommodate electrocautery. In double puncture technique, a 7-mm rigid thoracoscope is used with a second smaller 5-mm trocar that is used for intervention procedures.

This procedure can be done either under direct visual control through the endoscopic optic or indirectly by video transmission. Other procedures like cauterization of adhesions and blebs, electro coagulation or laser coagulation can also be carried out.

Medical thoracoscopy is usually performed under local anesthesia with premedication. It is usually performed with the patient in the lateral decubitus position with the affected side facing upwards.

With the help of ultrasound and CT chest the site for the introduction of the thoracoscope is decided carefully avoiding major vessels. The thoracoscope should not be inserted too low because the diaphragm or spleen may be injured .The usual site for inserting the thoracoscope is the sixth or seventh intercostal space between the mid- and anterior-axillary lines.

Before the thoracoscope is introduced, if there is no adequate separation between the lung and chest wall; ideally a pneumothorax of several hundred ml of air is should be induced. Only then Examination of the pleural space is possible. After introduction of trocar all the pleural fluid should be removed .After that the entire pleural cavity is inspected. Biopsies are taken from suspicious areas, usually from the parietal pleural. After thoracoscopy, an intercostal drainage tube is introduced.

Ernst *et al* have developed a semi rigid pleuroscope in the evaluation of the pleural space. This pleuroscope operates much like a bronchoscope and is easier to use.

INDICATIONS OF MEDICAL THORACOSCOPY:

- Undiagnosed Pleural Effusion
- Malignant Pleural Effusion
- Para pneumonic Pleural Effusion
- Postpneumonectomy empyema
- Pneumothorax
- Hemothorax
- Chylothorax
- Hepatic Hydrothorax
- Staging of lung cancer
- Pleurodesis
- Site-directed biopsy of parietal pleura
- Staging for mesothelioma

In a study by **Harris *et al***, 182 patients were studied. These patients underwent thoracoscopy. They were studied for a

five year period. He described a diagnostic sensitivity of ninety five percent for malignancy. Malignancy was proven by pleuroscopy in sixty six percent of patients who earlier had a closed pleural biopsy which was not diagnostic and in sixty nine percent of patients who had two reports of non diagnostic pleural cytology.

In another study by **Page *et al,*** in one hundred and twenty one patients with undiagnosed pleural effusion nearly the same sensitivity was obtained.

In an article published in the **Journal of Medical Association of Thailand** in 2009 March,92 ., Supplement 2:S,19-23 titled "Outcome of medical thoracoscopy" done by Tscheikunaj, Silairatna and colleague of the Division of Respiratory Disease and Tuberculosis, Department of Medicine, Faculty of Medicine, Siriraj Hospital, Mahidol University, Bangkok, Thailand the following findings were reported. Between 1998 and 2007, one hundred and forty two procedures of medical thoracoscopy were performed.

Of these 86 procedures were done in cases where the final diagnosis was not yet established. The yield was reported as 95.2%. The malignancy was diagnosed by thoracoscopy in 45.35% of cases. In cases where talc pleurodesis was done [22 patients] , three patients experienced failure of pleurodesis due to trapped lung. After a follow up of one twenty four days, seventeen patients had no recurrence.

In fifteen patients who had loculated pleural effusion medical thoracoscopy was done but were successful in only 6 cases. For pneumothorax five were successes out of six procedures after a mean follow up of one hundred sixty seven days. In 12 cases of empyema, average hospital admission was 9.1 days post procedure. There were no serious adverse effects due to the procedure.

In another article titled "**medical thoracoscopy for undiagnosed pleural effusions, experience from a tertiary care hospital in North India"** by Mootha VK,Jindal SK and colleagues from department of pulmonary medicine, Postgraduate Institute of Medical Education and Research, Chandigarh, India and published in Indian journal of chest diseases and allied sciences, 2011 January to March ,the following observations were made.

It was a retrospective analysis of medical pleuroscopies that were done from January 2007 to December 2008. The effusions were labelled as undiagnosed effusions if they had adenosine deaminase levels less than seventy IU/L and pleural fluid cytology for malignancy was not positive on three consecutive occasions.

The yield of thoracoscopy directed pleural biopsy for obtaining a diagnosis in such cases were evaluated. Complications of the procedure were also studied. The diagnostic yield of thoracoscopy directed pleural biopsy was around seventy four percent in patients classified as undiagnosed pleural effusions.

Malignancy was diagnosed in around forty eight percent of patients. There was one case of mesothelioma and other cases were secondary metastases to pleura. Lung and breast cancer were the most common sites of primary.

Tuberculosis was diagnosed in nearly twenty three percent of cases. They reported a low complication rate after procedure. Two cases of empyema were reported .They concluded that medical

pleuroscopy is a safe procedure .it has good diagnostic yield in cases of undiagnosed effusions.

In another article titled “Predictors of Pleural Malignancy undergoing Thoracoscopy’ by **Jaume Ferrer, MD; Juan Roldán, MD** and colleagues published in CHEST 2005, they have reported sensitivity of ninety four percent and specificity of hundred percent in the diagnosis of pleural malignancy. This was a prospective study of 93 patients. Data were obtained before thoracoscopy by thorough clinical history, patient interview, and physical examination.

Chest X rays and CT scans were analysed by two independent persons. After thoracoscopic procedure, all patients who did not have a diagnosis were registered for long-term follow-up. The researchers suggest that factors associated with malignancy of pleura were-include a more than one month of symptoms, no fever, and blood stained pleural fluid and computed tomography of chest findings suggestive of malignancy.

They further went to state that these four criteria if applied had offered adequate classification in ninety five percent of patients. Among twenty-eight patients who were positive for all four criteria, each one had malignancy. Another 21 patients had maximum one criterion and it turned out that none had malignancy.

In an article published in Respirology Journal by **Wilsher Ml and Veale AG** from Green Lane Hospital in New Zealand titled “Medical Thoracoscopy in the Diagnosis of Unexplained Pleural Effusion” the authors conclude that thoracoscopic pleural biopsy has a very high sensitivity for the diagnosis of benign and malignant diseases and vastly increased the diagnostic yield for pleural effusion.

Theirs was a retrospective study. They reviewed the records of all patients who underwent medical thoracoscopy between 1990 and 1996 .The study population was fifty eight. They had a minimum of two earlier diagnostic procedures including a blind pleural biopsy and pleural fluid cytology.

Among the patients 19 had mesothelioma, nine had pleural metastases and three had tuberculous pleuritis, six patients had asbestos related pleural fibrosis and three of the patients had post-cardiotomy syndrome, one patient was diagnosed as chylous effusion, one was due to traumatic and two others had benign pleural effusions.

In seven cases the pleural space was not able to be adequately assessed, but none of these patients had ct chest or ultrasound of the pleural space before the procedure. There were five cases of false negativity for malignancy, but no false positivity.

The sensitivity to diagnose pleural malignancy by thoracoscopic directed biopsy was eighty five percent and specificity was one hundred percent. No life threatening complications were reported, but four patients had seeding of thoracoscopy port site by primary tumour.

The authors concluded that medical pleuroscopy was a safe procedure with a good diagnostic yield. Pre-operative ultrasound or CT chest enables good access to the pleural space and lead to better diagnostic yield.

GENERAL CONSIDERATIONS:

Malignant effusions are considered as a sign of systemic disease rather than a localised one. The ideal treatment is that one which targets the malignancy systemically. But effective systemic treatment is frequently not feasible especially if the malignancy is refractory to systemic treatment. This is also the case in patients who have been already heavily treated.

In such circumstances locoregional treatment is needed for palliation of the symptoms. So in clinical practice the general considerations recommended are as follows:

- **ADEQUATE DRAINAGE:**

Many of the malignant effusions recur within one to three days after a simple pleural aspiration. Another ninety seven percent of cases experience a recurrence within a month. Closed tube drainage with an intercostal tube allows effective drainage of the pleural effusion.

It also allows the pleurae to oppose each other and hence may result in auto-pleurodesis. This will result in improvement in the general condition of the patient and preventing the recurrence of effusion. This can lead to a symptom free interval of a few weeks to months. But the primary disease remains to be treated.

- **AGENTS FOR INTRAPLEURAL INSTILLATION:**

The following agents can be used for intra pleural administration to create a pleurodesis:

- Talc
- Doxycycline
- Bleomycin
- Povidone iodine
- Interferon alpha

The most commonly used agents are sterile talc, tetracycline and bleomycin.

The basic evaluation of all ctypes of lung cancers begins first by classification and staging of the disease

The staging and the WHO classification are enumerated as follows:

NCCN STAGING -2012- Lung Cancer

T- PRIMARY TUMOUR

Tx - primary tumor not possible to see by radiology or FOB but bronchial wash or brush is positive for tumor.

T0 – no evidence of primary malignancy

Tis – carcinoma in situ

T1 – tumor is less than 3 centimetres in the greatest dimension surrounded by lung or visceral pleura, with no bronchoscopic evidence of invasion before the lobe bronchus that is not main bronchus

T1a - tumor less than or equal to 2 cm in the greatest dimension

T1b - tumor more than 2 cms but less than 3 cms

T2 - tumor size between 3 cms to 7 cms or

Tumor with the following features- any one

Involvement of the main bronchus

Or greater than or equal to 2 cms distal to the carina

Invasion of the visceral pleural surface

Or associated with atelectasis or obstructive pneumonitis till the hilar region but not involving the entire lung

T2a - tumor greater than 3cms but less than or equal to 5 cms

T2b – greater than 5 cms but less than or equal to 7 cms

T3 – tumor greater than 7 cms or with direct invasion of anyone of following structure- chest wall includes superior sulcus tumors, diaphragm, phrenic nerve, mediastinal pleura, parietal pericardium or a tumor in the main bronchus less than 2 cms from the carina but without involving the carina or with atelectasis or obstructive pneumonitis of whole lung or separate tumor nodule o nodules in the same lobe

T4 – tumor of any size with invasion of any following structures- mediastinum, heart , great vessels , trachea, recurrent laryngeal nerve, esophagus, vertebral body , carina, separate tumor nodule or nodules in a different ipsilateral lobe

N REGIONAL LYMPH NODES

Nx - not able to be assessed

N0 – no regional lymph node metastases

N1 - metastases in ipsilateral peribronchial with or without

same side hilar lymph nodes and intrapulmonary nodes including direct extension

N2 – metastases in same side mediastinal with or without subcarinal lymph nodes

N3 - metastases in opposite side mediastinal or hilar or same side scalene or supraclavicular lymph nodes

M - DISTANT METASTASES:

Mx – not able to be assessed

M0 – no distant metastasis

M1 - distant metastases

M1a – separate tumor nodules in opposite side lobe, tumor with nodules on the pleura or malignant pleural or pericardial effusion.

M1b – distant metastases.

TNM STAGE GROUPING

T/M	N0	N1	N2	N3
T1a	1a	2a	3a	3b
T1b	1a	2a	3a	3b
T2a	1b	2a	3a	3b
T2b	2a	2b	3a	3b
T3	2b	3a	3a	3b
T4	3a	3a	3b	3b
M1a	4	4	4	4
M1b	4	4	4	4

WHO CLASSIFICATION OF MALIGNANT EPITHELIAL NON SMALL CELL LUNG TUMORS

MAJOR SUBTYPE	**VARIANTS**
Squamous cell ca.	Papillary
	Clear cell
	Small cell
	Basaloid
Adenocarcinoma	Mixed
	Acinar
	Papillary
	Bronchioloalveolar
	Mucinous solid type
Adenosquamous	
Large cell ca.	Large cell neuroendocrine
	Basaloid
	Lymphoepitheliomas
	Clear cell
	Large cell rhabdoid
Major subtype	**Variants**
Sarcomatoid ca.	Pleomorphic

	Spindle cell
	Giant cell
	Carcinosarcoma
	Blastoma
carcinoid	Typical
	Atypical
Salivary gland	Adenoid cystic
	Mucoepidermoid
	Epithelial myo epithelial

SMALL CELL LUNG CANCER- STAGING

Small cell carcinoma	Limited
	Extensive

OVERVIEW OF THE MANAGEMENT OF LUNG CANCER:

Limited stage disease- disease confined to ipsilateral hemithorax which can be safely covered within a tolerable radiation portal.

Extensive stage disease- disease beyond the ipsilateral hemithorax which may include malignant pleural or pericardial effusion or hematogenous metastases .

According to Light`s text book, lung cancer causes a majority of malignant pleural effusions. Sometimes the pleural effusion is the first or initial presentation of the malignancy. During the disease progression nearly half of the patients develop effusions both unilateral and bilateral.

One of the predictors for pleural effusions in cases of lung malignancy is the presence of anti- p 53 antibodies. In a case series quoted in light`s book nine out of ten patients that comes to around 90 percent who had anti p53 antibodies had pleural effusions. In the same study forty two patients out of one hundred and fifteen patients that

comes to around thirty six percent who were negative for the antibody did not have effusions. The reason for this occurrence or whether it has an etiopathological correlation is yet to be studied or scientifically proven.

One another finding that has been suggested earlier is that even with extensive visceral pleural involvement pleural effusions do not occur. In a study paper from light`s one thousand seventy four patients who had surgery that is lung resection for curative purpose only about twenty seven percent had visceral pleural involvement. But these patients had a poor five year survival rate. This rate was around fifty percent. Another finding in this study was that the pleural fluid studies revealed higher positivity in case with visceral pleural involvement.

When patients are treated with lung resection with curative intent for adenocarcinoma they may develop a pleural effusion. This is particularly positive if there is prior involvement of lymph node or the pleura itself by the tumour per se. These effusions had occurred after a mean time of eight months.

The distressing fact about malignant pleural effusions is that these cases generally represent incurable disease thereby heralding a poorer prognosis.

The management of malignant pleural effusions include the following steps-

1.thoracentesis- for relief of dyspnea

2. tube thoracostomy

3. pleurodesis

4. identification of the primary tumor

5. fibroptic bronchoscopy – if there is ipsilateral mediastinal shift

6.chemotherapy- systemic chemotherapy is used, intrapleural chemotherapy is not of proven benefit.

7. radiotherapy – in cases of lymphoma or small cell carcinoma.

8.pleurectomy - parietal pleurectomy in selected cases.

Malignant pleural effusion is staged as M1a disease in the recent American joint committee for cancer staging manual seventh edition of 2010.

Sixty percent of small cell lung cancer and forty percent of lung cancer present with disseminated disease at diagnosis.

Around fifteen percent of lung cancer patients have pleural involvement at initial presentation and fifty percent of patients develop pleural effusions during the course of the disease.

Management of non small cell lung cancer is different from that of small cell cancer. Added to this management of such patients with effusions is still more difficult. The treatment of lung malignancies is given below:-

MANAGEMENT OF NON SMALL CELL LUNG CANCER:

For stage 1, stage 2 and selected stage 3 patients surgery is standard of care.

Neo adjuvant or adjuvant treatment is mostly required as complement to surgery in stage 2 stage 3 patients. Such management is possible in only twenty percent of lung cancer patients.

For stage 3 patients, concurrent chemotherapy with radiation is recommended. The chemotherapeutic agents used are

- Cisplatin with etoposide
- Cisplatin with vinorelbine
- Cisplatin with vinblastine
- Cisplatin with paclitaxel
- Cisplatin with gemcitabine
- Cisplatin with pemetrexed
-

All regimens are based on the primary drug namely cisplatin. So these regimens are called `cisplatin doublets`

The doses used are

Cisplatin – 50 mg per m^2

Etoposide -100 mg per m^2

Vinorelbine- 25-30 mg per m^2

Vinblastine- 4 mg per m^2

Gemcitabine -1250 mg per m^2

Pemetrexed- 500 mg per m^2

If patients are not able to tolerate cisplatin then alternative regimen of paclitaxel with carboplatin can be used.

For patients in stage 4 disease the treatment options are

- palliative chemotherapy
- palliative radiotherapy
- best supportive care

Palliative radiotherapy may be indicated in the following occasions-

- major airway obstruction
- severe hemoptysis
- superior vena caval obstruction
- pain due to skeletal secondaries in the weight bearing bones and spine
- symptomatic brain secondaries

With all the above management the five year survival rate for stage 1 disease is sixty five percent, stage 2 is forty

one percent, stage 3 is only nine percent. The expected survival of stage 4 patients is less than a year

MANAGEMENT OF SMALL CELL CANCER:

In less than five percent of patients with this disease early diagnosis in stage one is possible. Mostly the disease is diagnosed in late stages. T 1 and T2 node negative disease alone benefit from surgery. Otherwise all the patients are treated with chemotherapy and radiation. Small cell ca is highly responsive to both chemotherapy and radiotherapy.

Radiotherapy for lung cancer is best delivered by conformal techniques like three dimensional conformal radiotherapy,intensity modulated type,image guided variety since lung is mostly mobile during respiration.

The usual dose is forty five to sixty Gray in 1.8 to 2 gray per fraction. Solitary lesions in periphery of lung can be treated with stereotactic radiosurgery or stereotactic body radiotherapy. Radiation is administered with proper immobilization methods and treatment planning system.

MANAGEMENT OF TUBERCULOUS EFFUSIONS:

Pleural fluid analysis in tuberculous pleural effusions usually reveal the following features : -

Cell count analysis

- exudates mostly , occasionally serous
- blood stained in ten percent of cases
- more than fifty percent of effusions are lymphocytic
- mesothelial cells are usually less than five percent
- eosinophils are less than fifty percent. If it is more than fifty percent then possibility of traumatic effusion should be considered

Smear for tubercle bacillus

- the smear for acid fast bacilli in pleural fluid is positive in less than ten percent of cases

Culture for AFB

- culture for tubercle bacillus is better sensitive.
- The pleural fluid for culture should be collected in a heparinised container.
- Bactec culture is advisable

Closed biopsy-

Cope`s or abram`s pleural biopsy needle yields granulomas in nearly fifty percent cases

- Culture positivity in closed biopsy of pleura is around thirt to eighty percent.

Adenosine deaminase levels -

- Adenosine deaminase levels – more than seventy IU/L is suggestive of tuberculous pleuritis
- Adenosine deaminase levels type 2 is predominant in pleural fluid.
- A ratio of type 1 to type 2 of less than 0.45 is more suggestive for tuberculosis.

Interferon levels -

- Pleural fluid interferon gamma levels are raised in these effusions
- Other tests used are
    - Kaolin agglutination test for mycobacterial antibodies
    - Increase pleural fluid lysozyme.

Gold standard test

- Thoracoscopy is the gold standard for diagnosis of tuberculous pleuritis .
- The pleurae are covered by grayish white granulomas.
- Polymerase chain reaction is also another useful test and is positive in thirty to sixty percent of culture negative pleural effusions

TREATMENT OF TB EFFUSIONS –

- Short course chemotherapy
- Steroids are added after initiation of anti TB treatment
- Dose of steroids is 0.5 to 0.75 mg/kg

COMPLICATIONS –

- Pleural thickening
- Pleural fibrosis
- Pleural calcification
- Fibrothorax

In human immunodeficiency virus infected patients pleural fluid tuberculosis bacteria yield is more .

When the CD 4 count is less than two hundred there is more chance of AFB positivity in effusions.

In some cases non tuberculous mycobacteria can cause pleural effusions. Examples for such bacteria are

- Mycobacterium avium intracellulare
- Mycobacterium kansasii.

AIM OF THE STUDY:

To study the value of thoracoscopic biopsy performed in cases of hemorrhagic pleural effusions, done at a tertiary care hospital in Tamilnadu , South India .

MATERIALS AND METHODS

STUDY DESIGN: Descriptive, prospective, observational study

STUDY POPULATION:

All patients who satisfied the inclusion criteria were included in the study. The total number of patients was 82. [Male-57, female-25]

STUDY PERIOD: May 2011 to April 2012

INCLUSION CRITERIA:

1. Patients with clinically and radiologically confirmed pleural effusion

2. Patients with hemorrhagic pleural effusion defined by three criteria-

[a] pleural fluid RBC < 2,00,000 per mm3,

[b] Pleural fluid hematocrit < 50% of peripheral blood

[c] Uniformly blood stained fluid in the tube while tapping of the effusion.

EXCLUSION CRITERIA:

1. Patients with straw colored fluid during tapping
2. Pleural fluid RBC> 2, 00,000 per mm3 of blood
3. Pleural fluid hematocrit > 50 % - Hemothorax
4. Patients with only initially blood stained fluid in the tube
5. Patients not willing for the procedure
6. Bleeding diathesis

INVESTIGATIONS:

Apart from a detailed history & clinical examination, the following investigations were done-

- complete haemogram
- Bleeding time/Clotting time
- sputum for AFB
- mantoux, HIV-ELISA ,HBsAg,

- Chest X Ray, CT scan Chest with contrast.
- Pleural Fluid- AFB ,cell Count, sugar , protein, pH, hematocrit
- Pleural Fluid- Cytology for malignant cells
- Pleural Fluid RBC Count
- Thoracoscopic Biopsy

PROCEDURE:

First an informed consent was obtained from the patient and his/her attenders. Only then was the patient subjected to the procedure.

The patient was positioned with the diseased side up with a towel roll below the opposite axilla to expose the ribs more. The patient was monitored with a pulse oximeter probe throughout the procedure. The patient remained conscious throughout the procedure. After obtaining I.V access and ensuring availability of supplemental oxygen, the patient was draped and incisions made on the chest wall.

Based on the procedure planned one or two incisions were made. Inspecting visceral and parietal pleura, pleural biopsy, release of adhesions, pleural abrasion, evacuation of fluid, searching for air leak sites

were the procedures done after gaining visual access to the pleura with the thoracoscope. After the procedure an intercostal drainage [ICD] tube was put in place.

The procedure was done in compliance with British Thoracic Society guidelines. The samples of pleural fluid were collected in heparinised test tubes and were subjected to the required investigations.

In some patients, after the thoracoscopic biopsy, pleurodesis was done on table. The material used for pleurodesis was Povidone-iodine .In a few patients' adhesiolysis was done during the thoracoscopic procedure to enable adequate lung expansion. The intercostals drainage tube was kept in place till the fluid drain per day fell to less than 100 ml/day after which it was removed.

POSTOPERATIVE CARE:

After the procedure, the patient was shifted to the intensive respiratory care unit for observation period of 24 hours, after which he/she was shifted to post operative ward.

Adequate pain relief, appropriate antibiotic cover and daily ICD tube care, sterile precautions for dressing were provided to ensure safe and uneventful post operative stay. Check x rays were taken on immediate postoperative period, day 2 and day 7 for follow up.

DIAGNOSIS AND FOLLOW UP :

Once the final diagnosis from the histopathological report of the thoracoscopic biopsy arrives the patients were informed immediately. Based on the diagnosis, the patients were managed accordingly with antitubercular treatment or prompt oncology referral for chemotherapy or radiotherapy or other modalities.

ETHICAL CONSIDERATIONS:

- Since medical thoracoscopy is an invasive procedure, all patients subjected to the procedure were done so only after getting a fully informed consent, explaining about the importance of the procedure to make a diagnosis & for treatment.
- Another consent form in local language providing information regarding the procedure and willingness to take part in studies was also obtained.
- The required approval letters from Institutional Ethical Committee of Stanley medical college & Institutional Review Board of Government hospital of thoracic medicine was obtained

RESULTS

The results of the value of thoracoscopic biopsy performed in 82 cases of hemorrhagic pleural effusions who satisfied the inclusion and exclusion criteria, done at a tertiary care hospital in Tamilnadu , South India are shown below

1.AGE DISTRIBUTION:

The maximum number of patients were in the age group of fifty one to sixty years [n=29]. The patient with the lowest age was thirty one years and maximum age was seventy six years. Five patients were above seventy years and tolerated the procedure well.

Age Distribution:

AGE IN YEARS	NO. OF PATIENTS	PERCENTAGE
31 TO 40	15	18.29%
41 TO 50	22	26.82%
51 TO 60	29	35.36%
61 TO 70	11	13.41%
>70	5	0.06%

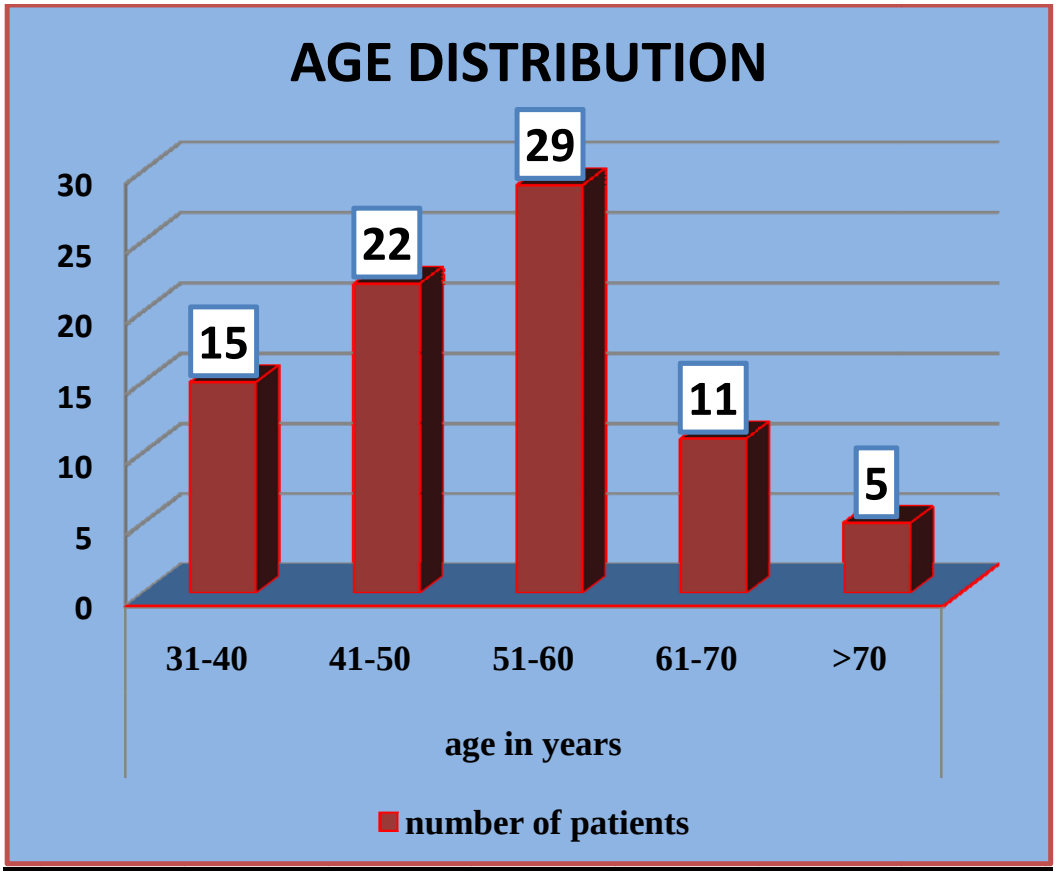
The younger age group had tuberculous etiology more common than malignancy. The statistical analysis revealed that age did not have a significant association with the final diagnosis [p value > 0.05].

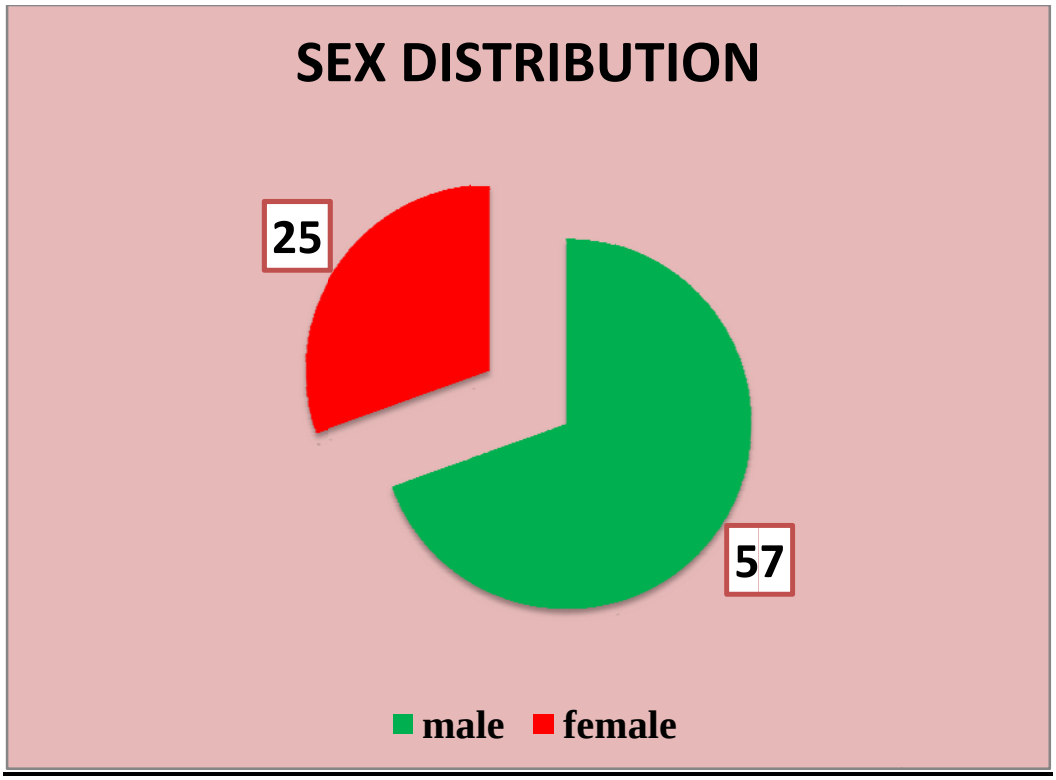
2. SEX DISTRIBUTION

Among the 82 patients 57 were male and 25 were female. There was no selection bias as all patients who met the inclusion criteria were included in the study. On analysis it was discovered that the sex of the patient did not have significant correlation with the diagnosis.

Sex Distribution:

SEX	NO. OF PATIENTS	PERCENTAGE
MALE	57	69.51%
FEMALE	25	30.48%


AGE DISTRIBUTION
30
25
20
15
10
5
0
15
22
29
11
5
31-40
41-50
51-60
61-70
>70
age in years
number of patients


SEX DISTRIBUTION
25
57
male
female

3.PLEURAL FLUID CELL TYPE:

The predominant pleural fluid cell type was lymphocytes in seventy nine of the eighty two patients. Three remaining patients had in addition to lymphocytes plenty of mesothelial cells. One among these had mesothelial count > 10% .All these three patients turned out to be mesotheliomas. The other cells found in plenty were erythrocytes.

Pleural fluid cell type:

PLEURAL FLUIDCELL TYPE	NO. OF PATIENTS	PERCENTAGE
LYMPHOCYTES	79	96.34%
LYMPHOCYTES + MESOTHELIAL CELLS	3	3.6%

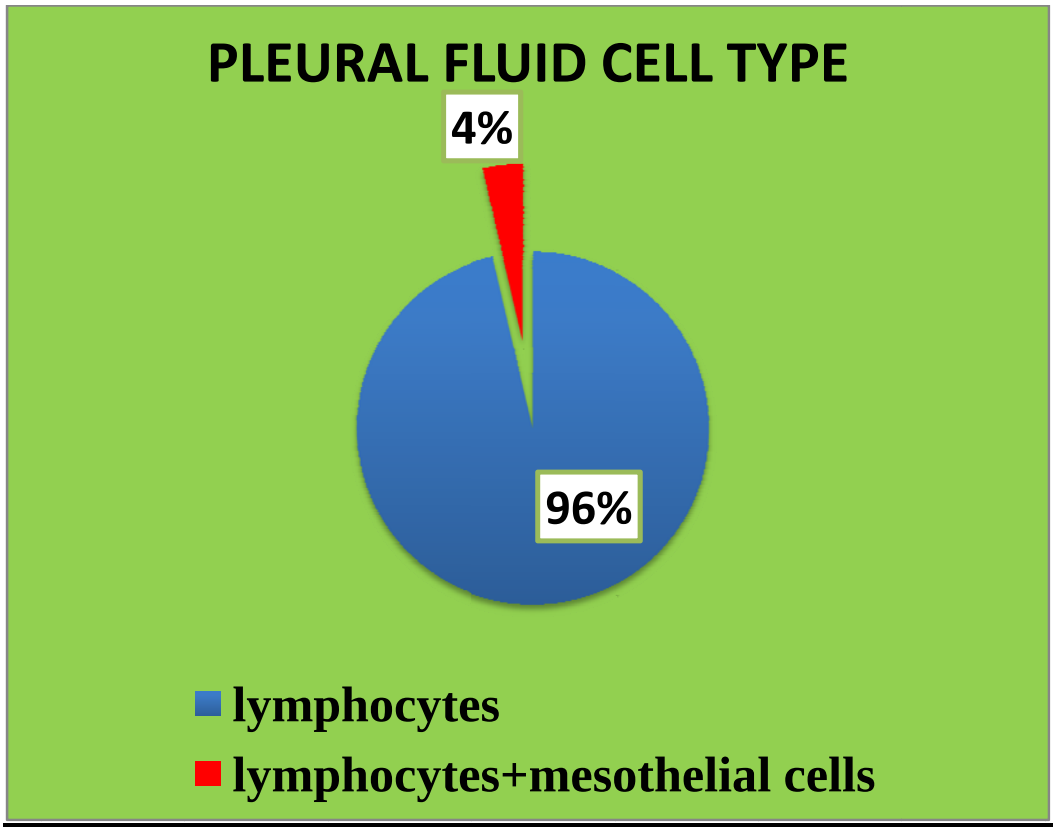
4. PLEURAL FLUID GLUCOSE:

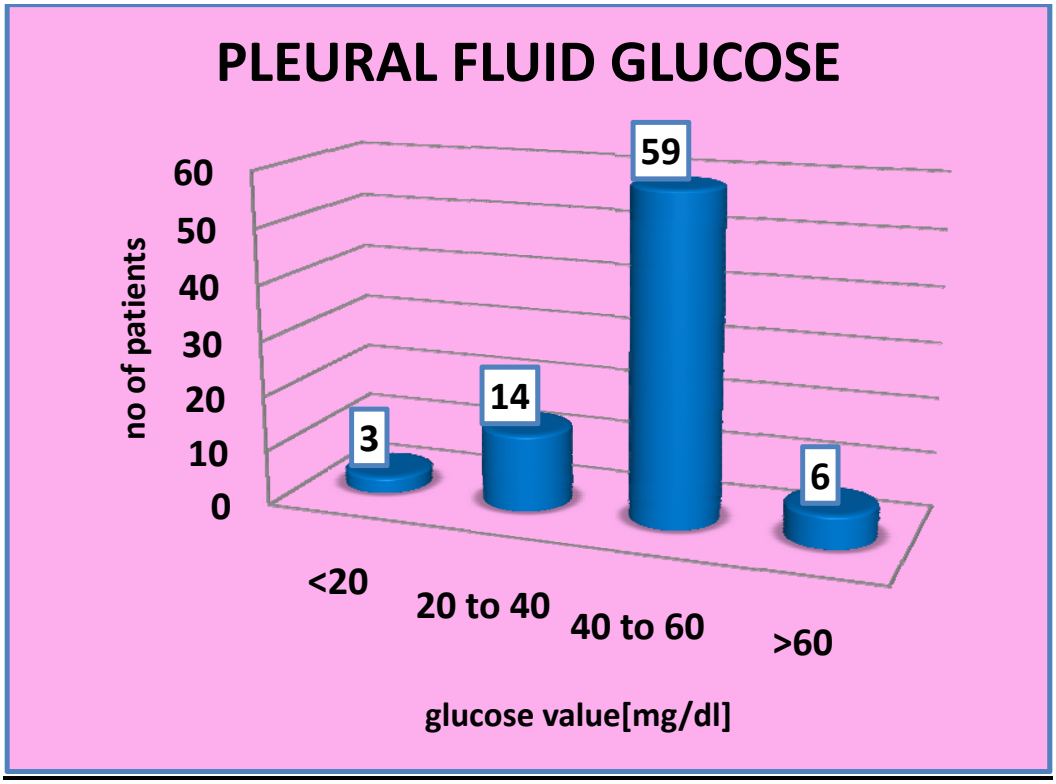
A total of fifty nine patients had pleural fluid sugar values in between 40 to 60 mg/dl. Three patients had sugar values of less than 20 mg/dl and showed extensive involvement of the pleural surfaces.

The mean pleural fluid glucose value was 46 mg/dl. The pleural fluid glucose values had a significant association with the diagnosis and the p value was found to be significant.

Pleural fluid glucose:

PLEURAL FLUID GLUCOSE mg/dl	**NO. OF PATIENTS**	**PERCENTAGE**
<20	3	3.6%
21 to 40	14	17.07%
41 to 60	59	71.95%
>60	6	7.31%


PLEURAL FLUID CELL TYPE
4%
96%
lymphocytes
lymphocytes+mesothelial cells


PLEURAL FLUID GLUCOSE
no of patients
60
50
40
30
20
10
0
3
14
59
6
<20
20 to 40
40 to 60
>60
glucose value[mg/dl]

5. PLEURAL FLUID PROTEIN:

Sixty two patients had pleural fluid protein values above 4.0 mg/dl. All the eighty two patients were classified as exudates as per light`s criteria. Hence the protein values did not have any significant association with the final diagnosis.

Pleural fluid protein:

PROTEIN mg/dl	NO. OF PATIENTS	PERCENTAGE
3.1 to 4	20	37.03%
4.1 to 5	54	65.85%
>5	8	9.75%

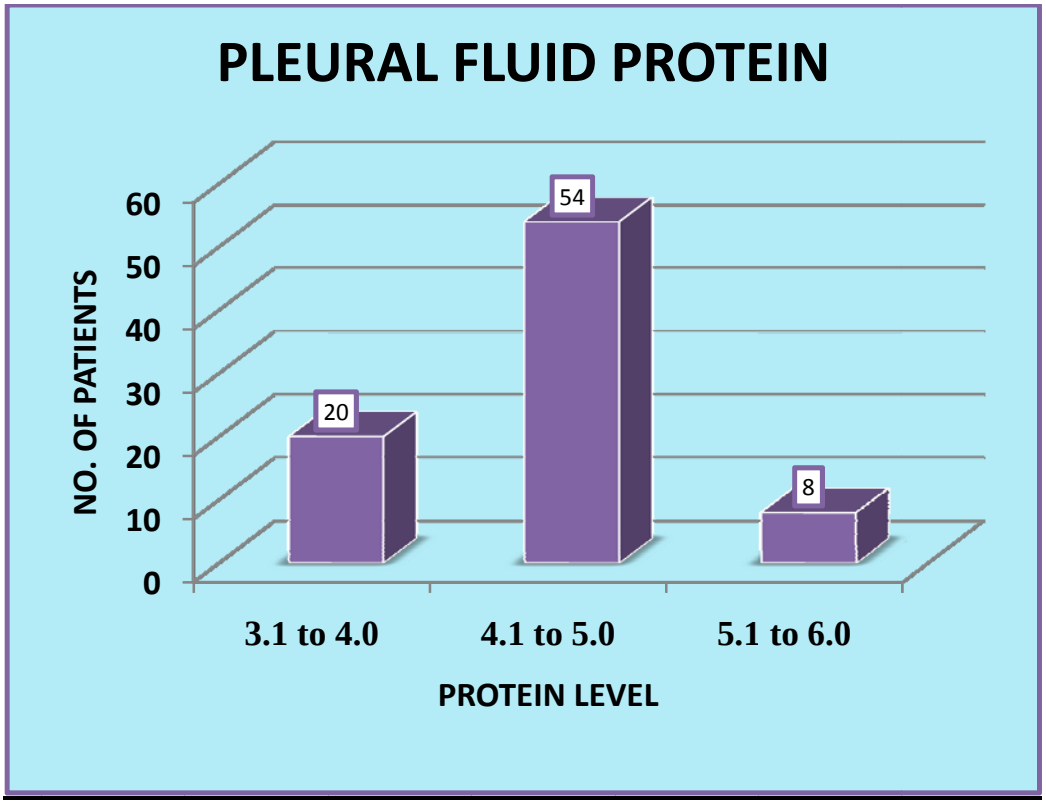
6. PLEURAL FLUID pH:

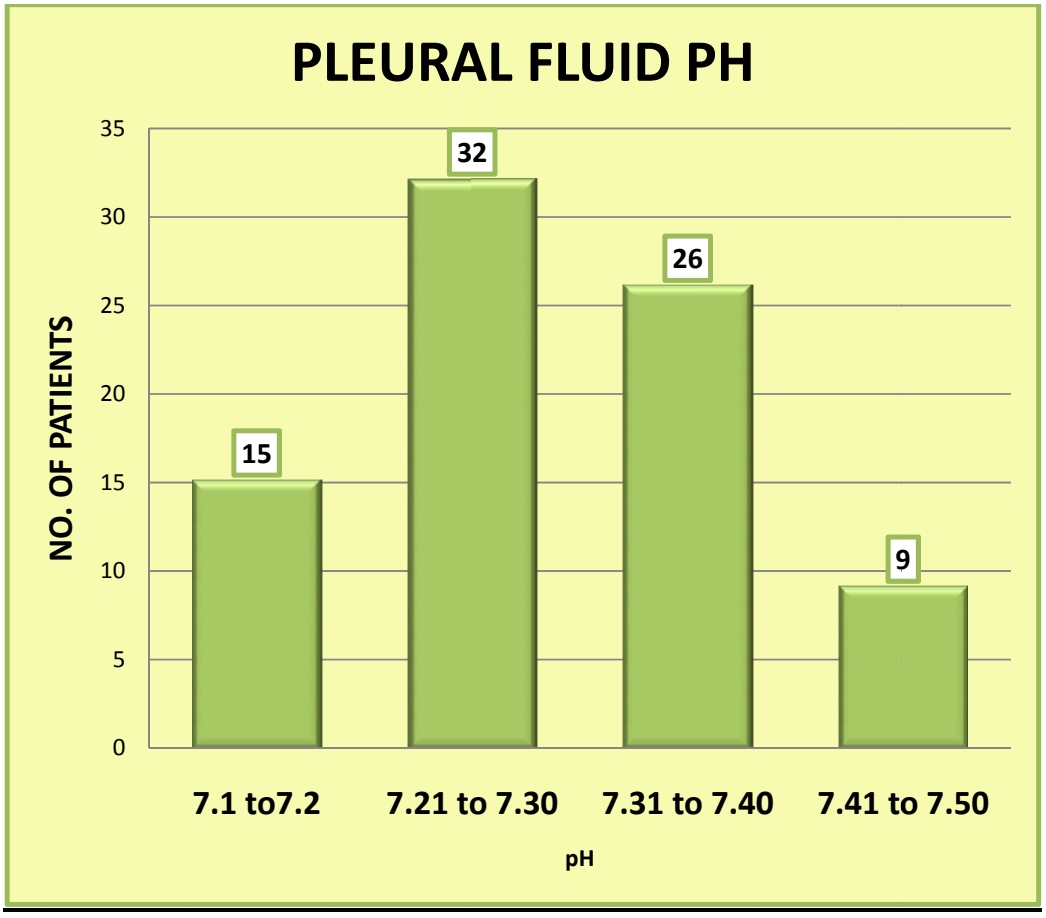
The lowest pleural fluid pH recorded was7.10. Fifteen patients had ph below 7.20. The maximum number of patients had the ph in range of 7.21 to 7.30.

The pH of pleural fluid did not have any significant association with the final diagnosis[p value was not significant].The mean pH was 7.28.

Pleural fluid Ph:

Ph	NO. OF PATIENTS	PERCENTAGE
7.1 to 7.2	15	18.29%
7.21 to 7.3	32	39.02%
7.31 to 7.4	26	31.70%
7.4 to 7.5	9	10.97%


PLEURAL FLUID PROTEIN
NO. OF PATIENTS
60
50
40
30
20
10
0
20
54
8
3.1 to 4.0
4.1 to 5.0
5.1 to 6.0
PROTEIN LEVEL


PLEURAL FLUID PH
NO. OF PATIENTS
35
30
25
20
15
10
5
0
15
32
26
9
7.1 to7.2
7.21 to 7.30
7.31 to 7.40
7.41 to 7.50
pH

7. PLEURAL CYTOLOGY FOR MALIGNANT CELLS:

The pleural fluid cytology for malignant cells was positive in twenty three out of the total eighty two patients [28% of the patients]

Pleural cytology for malignant cells:

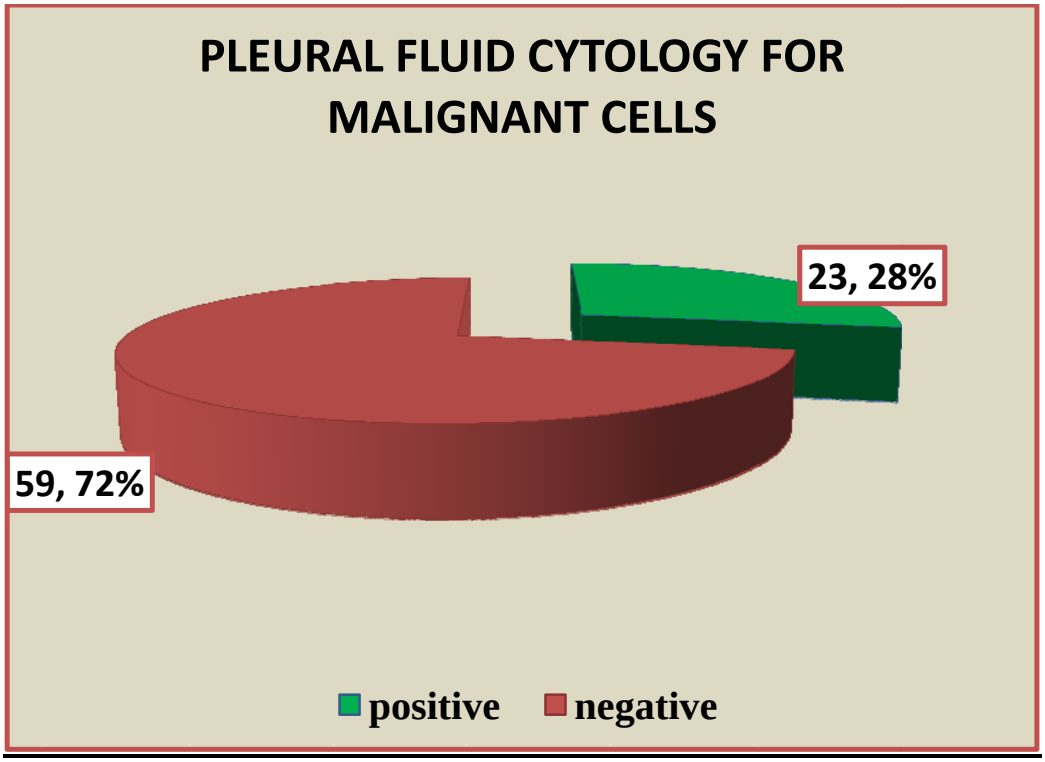
PLEURAL CYTOLOGY FOR MALIGNANT CELLS	**NO. OF PATIENTS**	**PERCENTAGE**
Positive	23	28%
Negative	59	72%

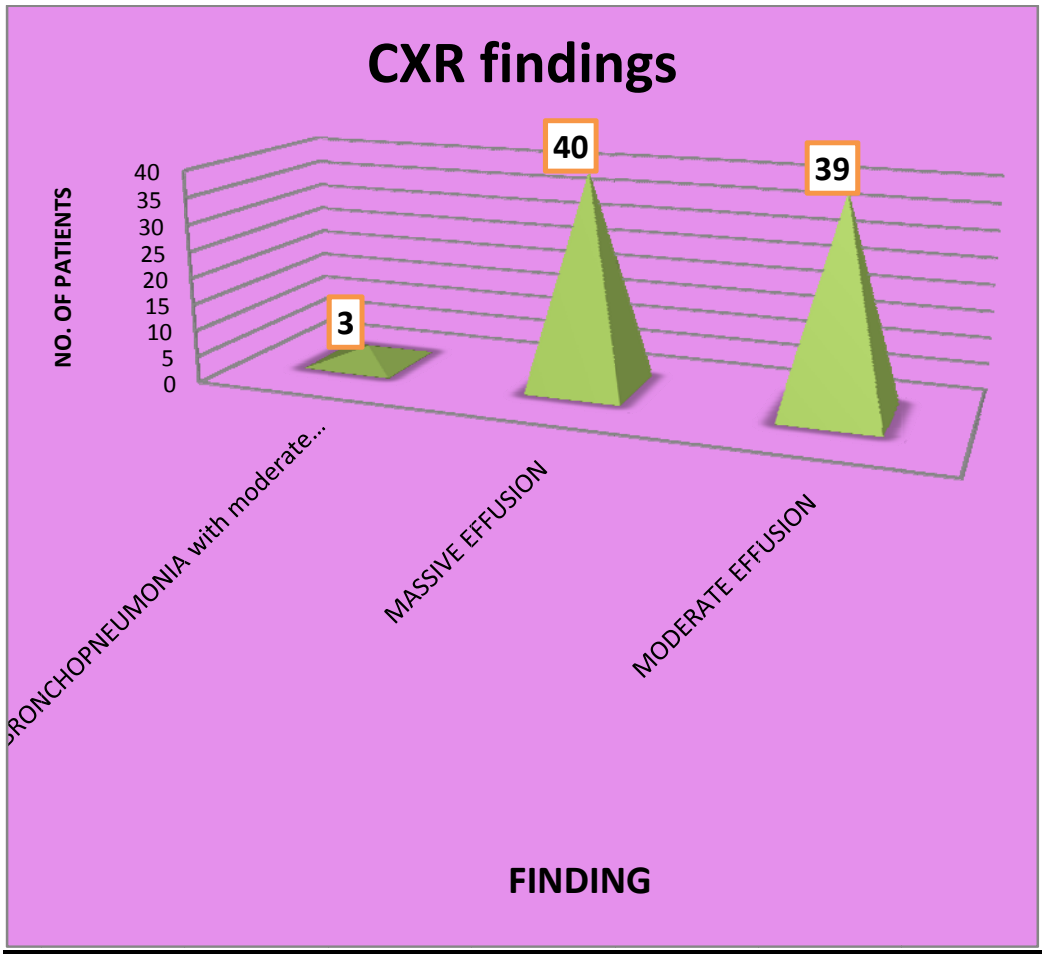
8. CHEST X RAY FINDINGS:

The most common chest x ray finding was massive effusion [n=40] followed by moderate effusion [n=39]. Three patients had bronchopneumonia like findings with moderate effusion. These three turned out to be bronchioloalveolar cell carcinoma. The chest X rays were assessed by one radiologist to avoid inter observer bias.

Chest x ray findings:

FINDINGS	NO .OF PATIENTS	PERCENTAGE
Bronchopneumonia with effusion	3	3.65%
Moderate effusion	40	48.78%
Massive effusion	39	47.56%

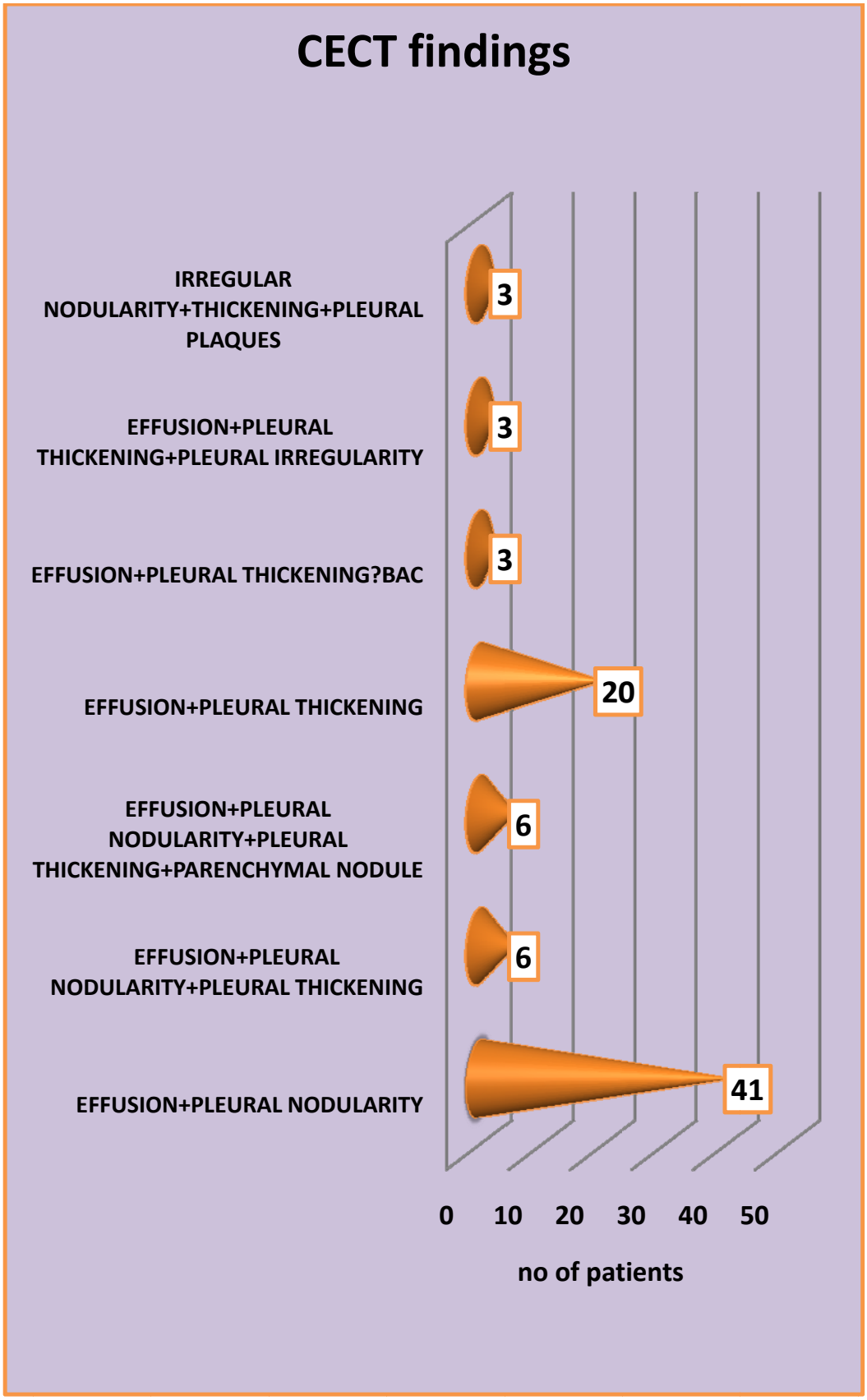

PLEURAL FLUID CYTOLOGY FOR MALIGNANT CELLS
23, 28%
59, 72%
positive
negative


CXR findings
NO. OF PATIENTS
40
35
30
25
20
15
10
5
0
3
40
39
RONCHOPNEUMONIA with moderate...
MASSIVE EFFUSION
MODERATE EFFUSION
FINDING

9. CONTRAST ENHANCED CT SCAN CHEST FINDINGS:

Contrast enhanced CT scan chest findings:

FINDING	NO.OF PATIENTS	PERCENTAGE
Irregular nodularity+thickening+pleural plaques	3	3.65%
Effusion+pleural thickening pleural irregularity	3	3.65%
Effusion+pleural thickening (?BAC)	3	3.65%
Effusion +pleural thickening	20	24.39%
Effusion+pleural nodularity+pleural thickening+parenchymal nodule	6	7.31%
Effusion+pleural nodularity+pleural thickening	6	7.31%
Effusion+pleural nodularity	41	50%


CECT findings
IRREGULAR NODULARITY+THICKENING+PLEURAL PLAQUES
3
EFFUSION+PLEURAL THICKENING+PLEURAL IRREGULARITY
3
EFFUSION+PLEURAL THICKENING?BAC
3
EFFUSION+PLEURAL THICKENING
20
EFFUSION+PLEURAL NODULARITY+PLEURAL THICKENING+PARENCHYMAL NODULE
6
EFFUSION+PLEURAL NODULARITY+PLEURAL THICKENING
6
EFFUSION+PLEURAL NODULARITY
41
0
10
20
30
40
50
no of patients

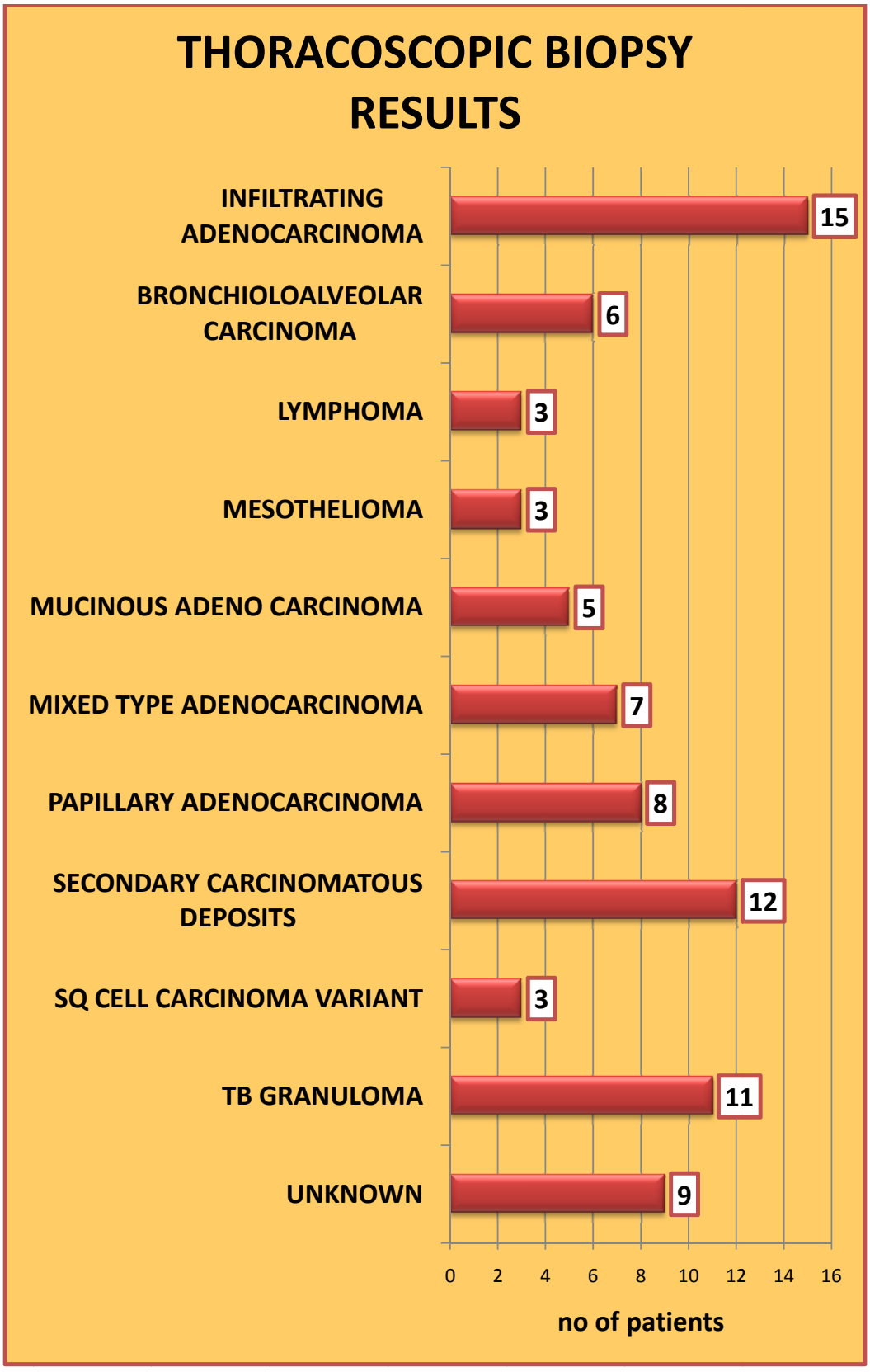
The most common finding on chest ct scan was pleural nodularity[n=41]. The second most common finding was pleural thickening[n=20]. Pleural plaques were found in three patients who eventually turned out to be mesothelioma.

The CT scans were evaluated by one competent radiologist to avoid inter observer bias. Contrast ct scans were only an aid to a diagnosis and guide to further interventions. They were also useful to localize parenchymal lesions if any were present. Such parenchymal lesions if found were subjected to image guided biopsy to rule out the possibility of lung primary.

10. THORACOSCOPIC BIOPSY RESULTS :

Thoracoscopic biopsy:

BIOPSY	NO. OF PATIENTS	PERCENTAGE
Infiltrating adenocarcinoma	15	18.29%
Bronchioloalveolar carcinoma	6	7.31%
Lymphoma	3	3.65%
Mesothelioma	3	3.65%
Mucinous adenocarcinoma	5	6.09%
Mixed type adenocarcinoma	7	8.53%
Papillary adenocarcinoma	8	9.75%
Secondary carcinomatous deposits	12	14.63%
Squamous cell carcinoma variant	3	3.65%
Tb granuloma	11	13.41%
Unknown	9	10.97%


THORACOSCOPIC BIOPSY RESULTS
INFILTRATING ADENOCARCINOMA
15
BRONCHIOLOALVEOLAR CARCINOMA
6
LYMPHOMA
3
MESOTHELIOMA
3
MUCINOUS ADENO CARCINOMA
5
MIXED TYPE ADENOCARCINOMA
7
PAPILLARY ADENOCARCINOMA
8
SECONDARY CARCINOMATOUS DEPOSITS
12
SQ CELL CARCINOMA VARIANT
3
TB GRANULOMA
11
UNKNOWN
9
0 2 4 6 8 10 12 14 16
no of patients

Among the eighty two patients thoracoscopic pleural biopsy yielded a diagnosis in seventy three patients [89 %]. The diagnosis was malignancy in sixty two patients [75%] and tuberculosis in eleven patients [13%].

In the remaining nine patients a diagnosis could not be arrived at even after biopsy. Reasons for this could be inadequate biopsy specimen, inappropriate selection of biopsy sites due to inter observer variations etc

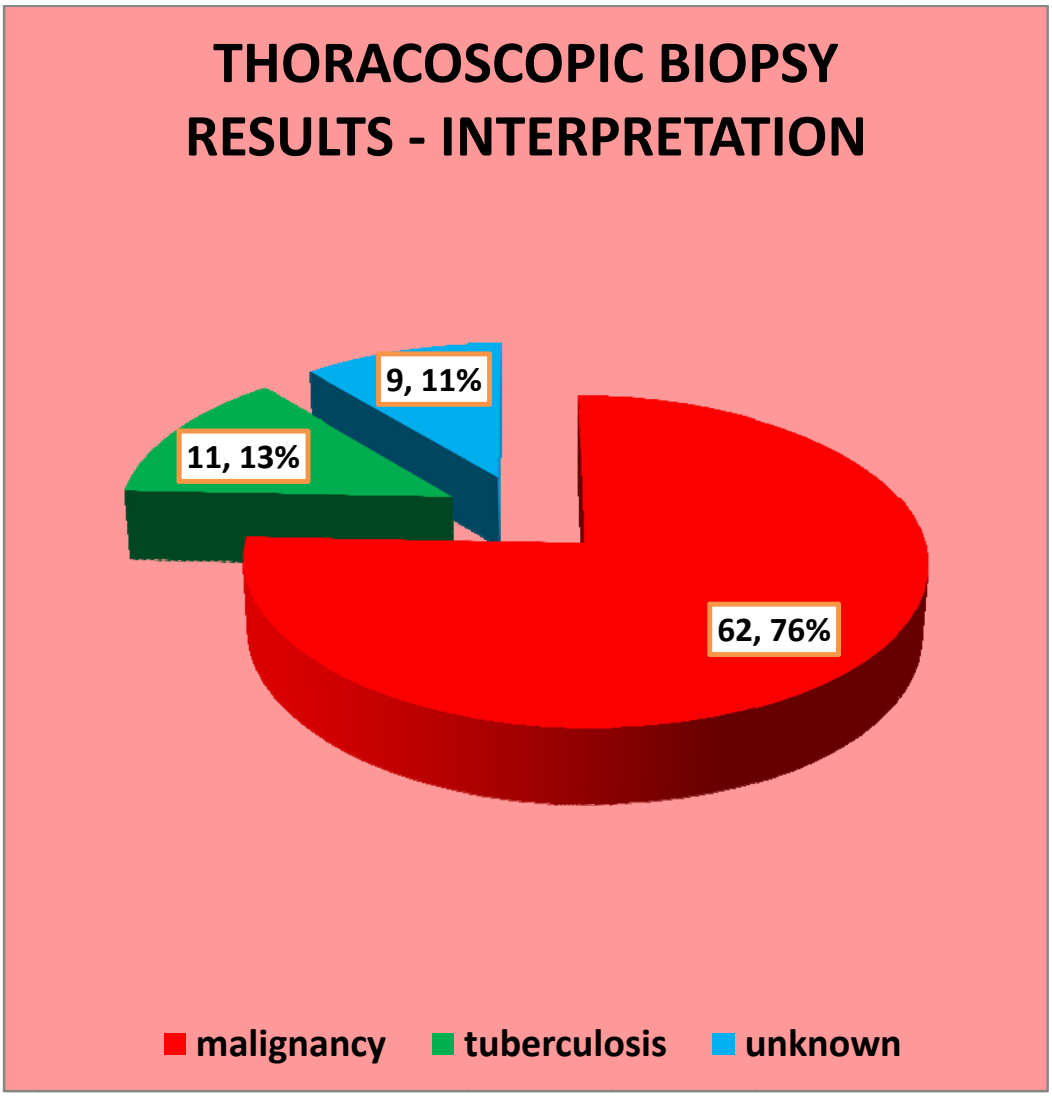
11. INTERPRETATION OF THORACOSCOPIC BIOPSY RESULTS:

Among the patients diagnosed as malignancy [n-62], the most common histological type was infiltrating adenocarcinoma[n= 15] followed by secondary carcinomatous deposits[n=12]. The third most common diagnosis was tuberculosis [n=11]. Three rare diagnoses of lymphoma, mesothelioma and squamous cell carcinoma variant were seen.

The consolidated results of the three groups are summarized in table-1 below.

Interpretation of thoracoscopic biopsy results:

BIOPSY RESULT	NO. OF PATIENTS	PERCENTAGE
MALIGNANCY	62	76%
TUBERCULOSIS	11	13%
UNKNOWN	9	11%



Based on the final diagnosis the study group was classified into three groups. Group 1 was malignancy [n=62], group 2 was tuberculosis [n= 11], group 3 was unknown [n= 9].

Comparison of imaging modalities:

FACTORS	MALIGNANCY	TUBERCULOSIS	UNKNOWN
Chest x ray	Massive effusion[33/62], moderate effusion [29/62]	Moderate effusion [11/11]	Massive [2/9], moderate [7/9]
CT scan with Contrast	Pleural nodularity /irregularity with effusion[48/62], parenchymal nodule [14/62]	Pleural thickening with effusion[11/11]	Pleural thickening / irregularity with effusion[9/9]

PLEURAL FLUID AND PATIENT CHARACTERISTICS:

FACTORS	MALIGNANCY	TUBERCULOSIS	UNKNOWN
Clinical picture[most common symptoms]	Chest discomfort, dyspnea	Chest discomfort, dyspnea	Chest discomfort, dyspnea
Pleural fluid [based on protein]	Exudate	Exudate	Exudate
Pleural fluid AFB	Negative	Negative	Negative
Pleural fluid Cytology[malignant cells]	Positive[23/62]	Negative [11/11]	Negative [9\9]
Pleural fluid sugar	[Mean] 43	[mean]46	[mean]51
Pleural fluid ph	[mean]7.28	[mean]7.4	[mean]7.35

COMPARISION OF FOB AND THORACOSCOPY:

FACTORS	MALIGNANCY	TUBERCULOSIS	UNKNOWN
bronchoscopy	Bronchial wash positive for malignancy [15/62]	Negative[9/11] , wash positive[2/11]	Brush ,wash negative [9/9]
Thoracoscopic biopsy	Positive [62/62]	Positive[11/11]	Inconclusive [9/9]

STATISTICAL ANALYSIS:

The patient characteristics were collected and recorded.they were analysed using descriptive statistics namely

-mean

-median

-range

The influence of the various study factors on the final diagnosis was studied using the following tests

-Pearson’s Chi Square

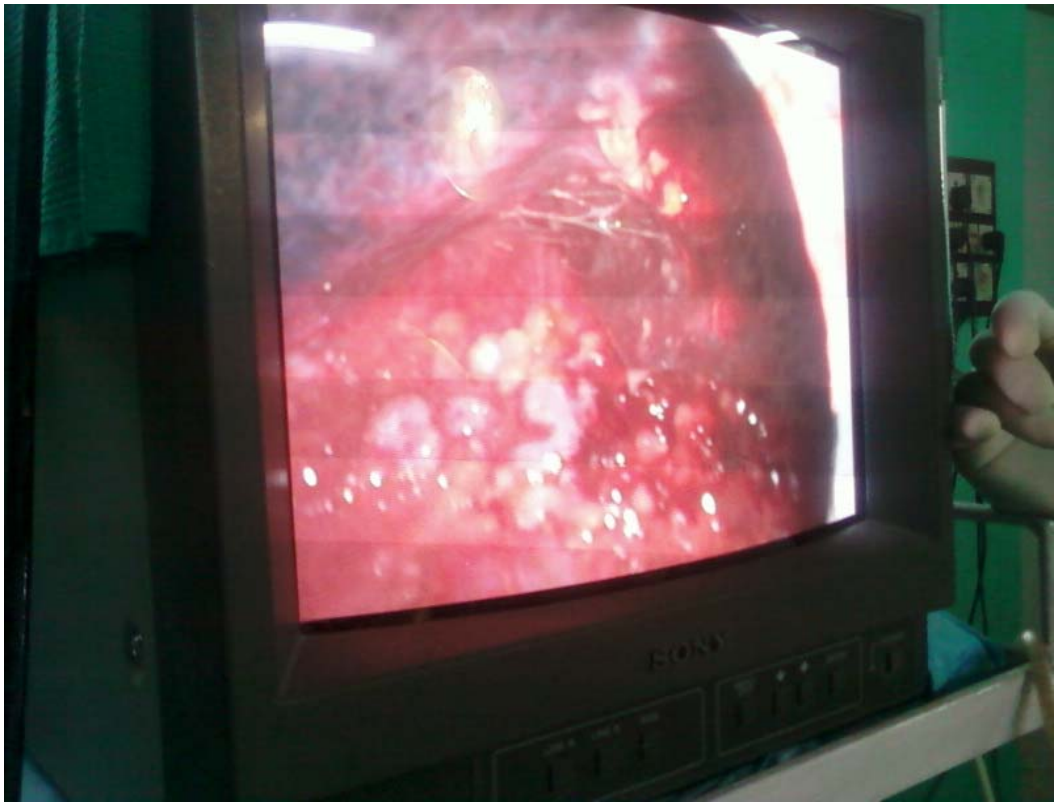
-Fischers Exact Test

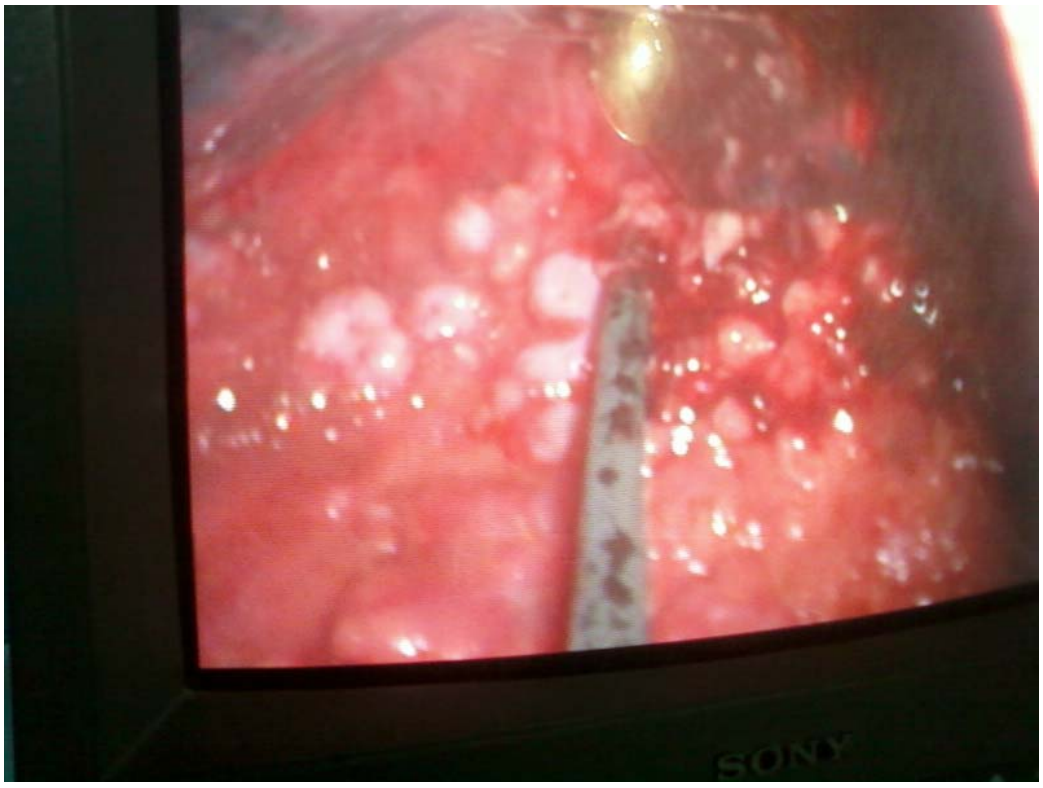
-Chi Square with Yate’s Correction

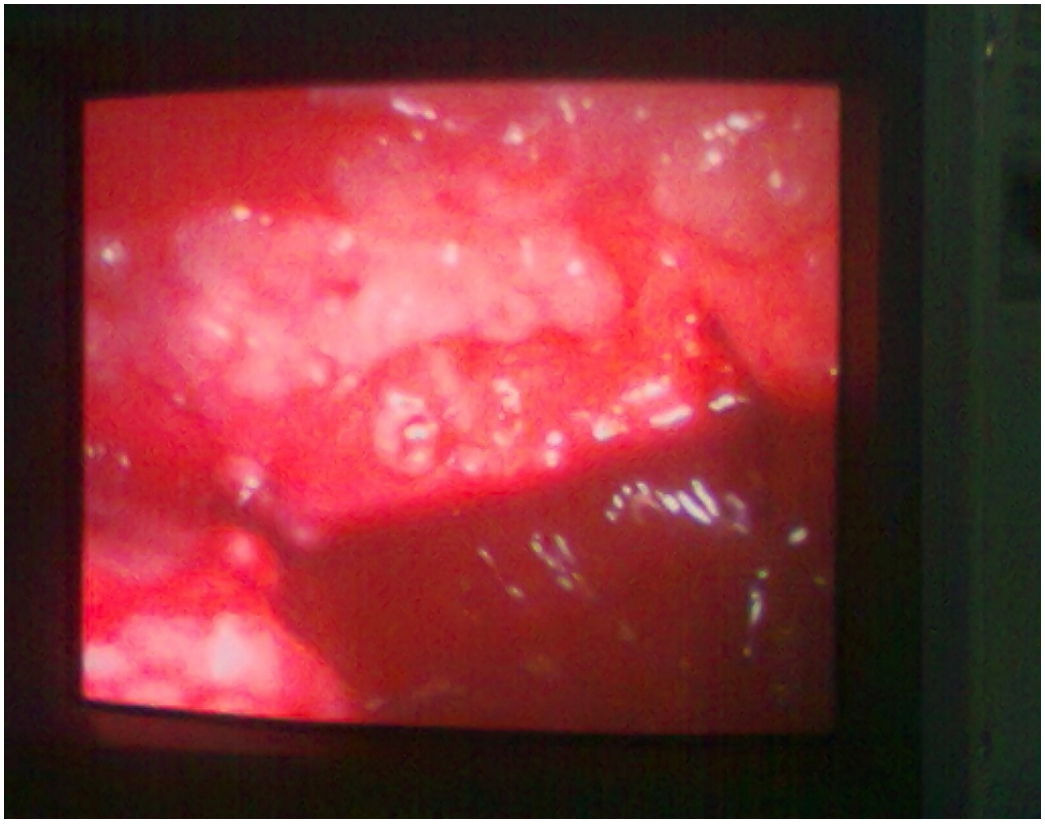
Statistical vaiue of the study is tabulated as follows:

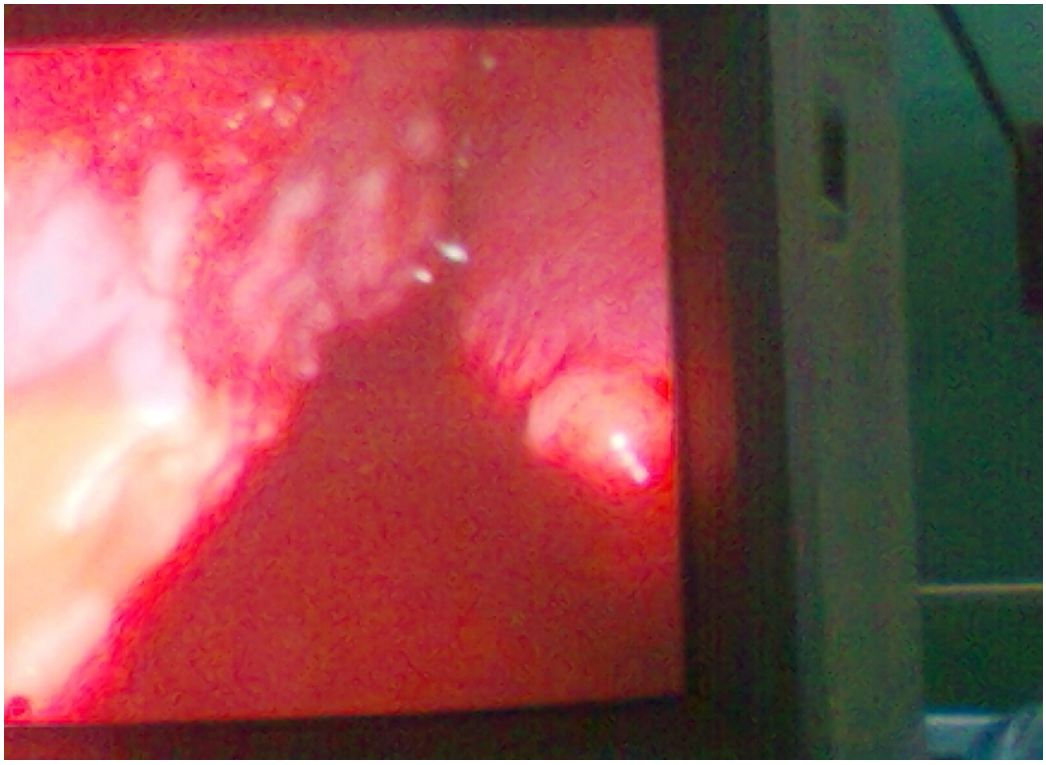
INFLUENCE OF THE STUDY PARAMETERS ON THE DIAGNOSIS:

PARAMETER	MEAN VALUE	CHI SQUARE VALUE	P VALUE
PLEURAL FLUID GLUCOSE	46 mg/dl	4.03	0.0447
PLEURAL FLUID PROTEIN	4.5mg/dl	0.34	0.5608
SEX	-	0.01	0.9504
AGE	51 years	2.76	0.0966
PLEURAL FLUID PH	7.28	0.34	0.5611

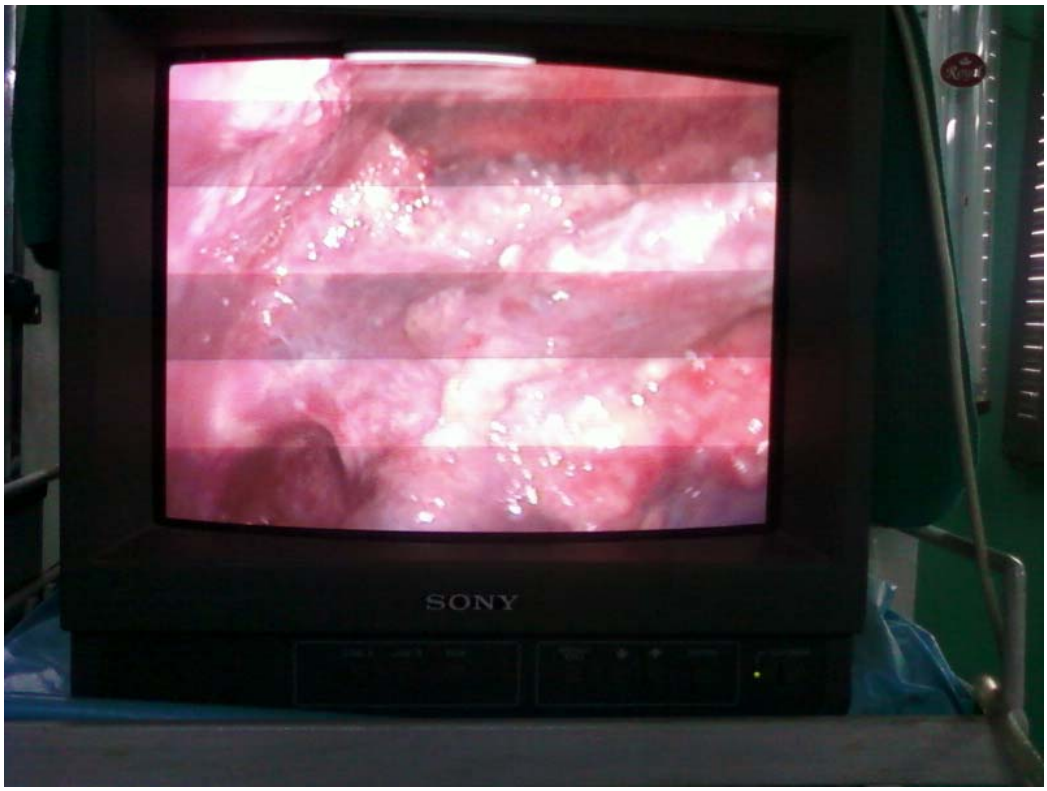

SONY


SONY






SONY


SONY

DISCUSSION

In this study the primary aim was to study the results of thoracoscopic biopsy in cases of hemorrhagic pleural effusions. Through this study it was also attempted to list out criteria for hemorrhagic effusions .

Hemorrhagic effusions were defined based on the pleural fluid RBC count, hematocrit and the nature of fluid seen during the tapping procedure. The effusion was confirmed earlier by chest x ray and ultrasound. The total number of patients that met the criteria during the study period of 24 months from May 2011 to April 2012 was eighty two. Among them 57 were male patients and 25 were female patients.

All the selected patients underwent routine investigations. After ascertaining that they had adequate maneuvering space between the pleurae by ultrasound, they were subjected to thoracoscopy. During thoracoscopy the parietal, visceral and diaphragmatic pleurae were visualized.

Any abnormal areas were biopsied under direct surveillance . a minimum of three and maximum of six biopsies were done per patient. After the procedure the ICD tube of appropriate size was left in situ. All the 82 patients consented for the procedure as they were adequately counseled and well informed regarding the safety and the necessity of the procedure. The results were analysed using the following statistical parameters-Chi square test with Yates correction,Fischer`s exact t test.

In this study the age of the patients varied between 31 to 76 years. When analyzing the association of age and the final diagnosis [both malignancy and tuberculosis], there was no significance with regard to the p value [$p>0.05$]. Hence it was inferred that age was not a significant predictor of the disease in our group of hemorrhagic effusion patients.

In the sex distribution ,since the male and female patients were not equal in number, the sexual predilection for a particular diagnosis could not be assessed.

When looking at the pleural fluid cytology all 82 cases were lymphocytic effusions. Among them 3 cases had high pleural fluid mesothelial cell count.All the 9 cases in which the diagnosis was still elusive were also lymphocytic effusions. The three cases with mesothelial cells rich pleural fluid turned out to be mesotheliomas .

It is an accepted thought that pleural fluid glucose is low in cases of malignancy. Three patients with pleural fluid glucose value less than 20mg/dl turned out to be infiltrating adenocarcinomas. Among the patients in the tuberculosis group the mean sugar value was 46 mg/dl.

On assessing whether the pleural fluid sugar value had any significance with relation to the final diagnosis it was found that the p value was significant[p value=0.0447]. Among the group of patients whose diagnosis was unknown the mean sugar value was 51 mg/dl. Of the 82 patients 14 patients were diabetic patients who were under insulin for glycemic control during the hospital stay.

All 82 cases were exudative effusions as classified by light`s criteria. The mean protein value was 4.5 mg/dl. [p

value=0..5608].The pleural fluid protein levels had no significance of correlation with the diagnosis .

Malignancy is one of the causes of a low pleural fluid pH. In this study the average value was 7.28. There was no significant correlation between pH and the final diagnosis and the p value was not significant [p value=0.5611]. The least value recorded was 7.1 which was recorded in the case of an infiltrating adenocarcinoma.

Pleural fluid cytology for malignant cells was positive in 23 of the 82 patients i.e in 28 % of patients. This gives a sensitivity of 37.10%[95% confidence interval 25.17% to 50.31%]. The calculated negative predictive value is 33.90%[95% confidence interval 22.09% to 47.39%]. Among the 23 patients,15 patients had adenocarcinoma. Of the other 8 patients 5 had secondary deposits of the pleura.

The radiological investigations namely the chest x ray and the contrast enhanced computed tomography scan were not definitive diagnostic modalities. They were aids to the diagnosis and acted as guide to the thoracoscopy procedure.

Of the 82 patients in the study 2 patients developed empyema and were treated with appropriate antibiotics .There was 8 deaths reported in the study group during the study period. Seven of these deaths were in the malignancy group most likely due to the disease per se and occurred after referral to oncology department for chemotherapy or radiotherapy.

One death was reported in the unknown group 3 months after being discharged at request from our institution and cause could not be discovered. There were no deaths attributed to the procedure of thoracoscopy further strengthening the idea that it is a very safe procedure.

The yield of our study was 89.02% i.e. we were able to arrive at a diagnosis in 73 patients out of 82. The following observations were also made at the end of the study:

- All the 73 patients had a short hospital stay. The mean duration of hospital stay was 8 days.

- The thoracoscopy was done as a third step in the diagnostic algorithm.

- After routine blood investigations, first step was diagnostic tapping. Next was radiological assessment namely chest x ray, ultrasound chest & CECT chest and date fixation for thoracoscopy.

- After full pulmonary assessment the patient was taken up for thoracoscopy.

- Because of such an algorithm the patients had 3 important benefits- early relief of symptoms, early confirmation of diagnosis and early referral to oncology or antitubercular therapy.

- Patient satisfaction in terms of physical and psychological aspects was very good.

- The positive predictive value of the procedure for malignancy in this study was 84.9% .

- The second most common cause of hemorrhagic effusions in our study was tuberculosis [11 out of 82 patients i.e 13% of the cases].

This turned out to be very important finding both for us and the patients.

- Six of these 11 patients had been referred to our institution as suspected malignant effusions by private hospitals and practitioners. When they came to know of the diagnosis and were promptly started on antitubercular therapy, the patients were happy and relieved to know that they did not have malignancy.

- The follow up of all the patients in the study group was done during the study period. The outcome of 54 patients were obtained and analysed. The remaining 28 patients could not be traced because of various reasons.

- Eight patients in the malignancy group had expired. All patients in the tuberculosis group had survived and completed antitubercular treatment.

- Among the patients in the group where even after thoracoscopy a diagnosis was not established [total 9 patients] none was willing for a repeat procedure or further investigations. All of them had opted for discharge at request since they were symptomatically better.

- The patients in the malignancy group who were referred to oncology department were registered for chemotherapy and were on follow up. They were also registered in the palliative clinic.
- In patients with secondaries of the pleura the primary could not be identified in 50% of the cases.

Among twelve cases of pleural secondaries the primary tumor site was identified in six persons. 2 had primary in bone[tibia] ,one had history of surgery in gastrointestinal tract for suspected malignancy ,two females with prior breast carcinoma, one other patient with lymphoma

CONCLUSION

In cases that are classified as hemorrhagic effusions, early intervention in the form of medical thoracoscopy is valuable in both diagnostic and therapeutic aspects. The advantages include early relief of symptoms, early diagnosis and early initiation of appropriate therapy. The total hospital stay is comparatively less and the overall patient satisfaction is good. Malignancy and tuberculosis were the two leading causes of hemorrhagic effusions in this study. The complication rate was negligible.

BIBLIOGRAPHY:

1. Rodríguez-Panadero F, López Mejías J. Low glucose and ph levels in malignant pleural effusions. Diagnostic significance and prognostic value in respect to pleurodesis. Am Rev Respir Dis 1989; 139:663.
2. Voellmy W. Results of thoracoscopies in the diagnosis of diseases of the lungs and of the pleura (Author's Transl). Poumon Coeur 1981; 37:67.
3. Richard W Light, Pleural Diseases, Fifth Edition
4. A Cantó, E Blasco, M Casillas, A G Zarza, J Padilla, J Pastor, V Tarazona, And F París .,Thoracoscopy in the diagnosis of pleural effusion. Thorax. 1977 October; 32(5): 550–554
5. Wilsher ML,Veale AG,.Respiratory Services, Green Lane Hospital, Auckland, New Zealand., Medical thoracoscopy in the diagnosis of unexplained pleural effusion. Respirology. 1998 Jun;3(2):77-80
6. Rajput AK, Garg N, Bhattacharya Darmy Hospital (R&R), Delhi ,Thoracoscopic pleural biopsy in undiagnosed exudative pleural effusion at a tertiary care chest centre. ,JAPI., December 2009 , Volume 57
7. Tscheikuna J, Silairatana S, Sangkeaw S, Nana A.Division Of Respiratory Disease And Tuberculosis, Department Of Medicine,

Faculty Of Medicine, Siriraj Hospital, Mahidol University, Bangkok, Thailand ., Outcome of medical thoracoscopy .J Med Assoc Thai. 2009 Mar;92 Suppl 2:S19-23. Chest (2005) 127: 1017-22.

8. J Ferrer, J Roldán, J Teixidor, E Pallisa, I Gich, F Morell Spriggs AI, Boddington MM. Predictors Of Pleural Malignancy In Patients With Pleural Effusion Undergoing Thoracoscopy .
9. Grune & Stratton, The cytology of effusions, 2nd Ed. New York: 1968
10. Fraser RS, Muller NL, Colman N, Et Al. Diagnosis of diseases of the chest, 4th Ed, Vol. I. Philadelphia: WB Saunders, 1999:563â€“594.
11. Hersh CP, Feller-Kopman D, Wahidi M, Et Al. Ultrasound guidance for medical thoracoscopy: A Novel Approach. Respiration 2003;70:299â€“301.
12. Light RW, Erozan YS, Ball WC. Cells in pleural fluid: their value in differential diagnosis. Arch Intern Med 1973;132:854â€“860.
13. Landreneau RJ, Mack MJ, Hazelrigg SR, et al. The role of thoracoscopy in the management of intrathoracic neoplastic processes. Semin Thorac Cardiovasc Surg 1993;5:219â€“228.
14. Burrows NJ, Ali NJ, Cox GM. The use and development of medical thoracoscopy in the United Kingdom over the past 5 years. Respir Med 2006;100:1234â€“1238.

15. Braimbridge MV. The history of thoracoscopic surgery. Ann Thorac Surg 1993;56:610â€“614.

16. Jacobaeus HC. The practical importance of thoracoscopy in surgery of the chest. Surg Gynecol Obstet 1922;34:289â€“296.

17. Brandt H-J, Loddenkemper R, Mai J. Atlas of diagnostic thoracoscopy. New York: Thieme Medical Publishers, 1985.

18. Boutin C, Viallat JR, Aelony Y. Practical thoracoscopy. Berlin: Springer-Verlag, 1991.

19. Loddenkemper R, Boutin C. Thoracoscopy: present diagnostic and therapeutic indications. Eur Respir J 1993;6:1544â€“1555.

20. Ernst A, Silvestri GA, Johnstone D. American College of Chest Physicians. Interventional pulmonary procedures: guidelines from the American College of Chest Physicians. Chest 2003;123:1693â€“1717.

21. Loddenkemper R. Medical thoracoscopy. In: Light RW, Lee YCG, eds. Textbook of pleural diseases, Chapter 44. London: Arnold Publishers, 2003:498â€“512.

22. Ernst A, Hersh CP, Herth F, et al. A novel instrument for the evaluation of the pleural space: an experience in 34 patients. Chest 2002;122:1530â€“1534.

23. Lee P, Colt HG. Rigid and semirigid pleuroscopy: the future is bright. Respirology 2005;10:418â€“425.

24. Migliore M, Giuliano R, Aziz T, et al. Four-step local anesthesia and sedation for thoracoscopic diagnosis and management of pleural diseases. Chest 2002;121:2032â€“2035.

25. Hucker J, Bhatnagar NK, al-Jilaihawi AN, et al. Thoracoscopy in the diagnosis and management of recurrent pleural effusions. Ann Thorac Surg 1991;52:1145â€“1147.

26. Menzies R, Charbonneau M. Thoracoscopy for the diagnosis of pleural disease. Ann Intern Med 1991;114:271â€“276.

27. Hansen M, Faurschou P, Clementsen P. Medical thoracoscopy, results and complications in 146 patients: a retrospective study. Respir Med 1998;92:228â€“232.

28. de Groot M, Walther G. Thoracoscopy in undiagnosed pleural effusions. S Afr Med J 1998;88:706â€“711.

29. Emad A, Rezaian GR. Diagnostic value of closed percutaneous pleural biopsy vs pleuroscopy in suspected malignant pleural effusion or tuberculous pleurisy in a region with a high incidence of tuberculosis: a comparative, age-dependent study. Respir Med 1998;92:488â€“492.

30. Diacon AH, Van de Wal BW, Wyser C, et al. Diagnostic tools in tuberculous pleurisy: a direct comparative study. Eur Respir J 2003;22:589â€“591.

Annexure-1 **PROFORMA**

Name : Age: Gender:

Occupation :

Address :

Phone No :

Height/Weight :

Smoking : Yes / No

Brand/quantity/Duration

If stopped when?

Alcohol use : Yes / No

Brand/quantity/Duration

If stopped when?

Tobacco use : Chew/Snuff No of times/day

COMORBID CONDITIONS:

Pregnancy : Yes/No

Peptic ulcer : Yes/No

Bronchial Asthma : Yes/No

Hypertension : Yes/No

Diabetes mellitus : Yes/No

SYMPTOMS

Cough :

Fever :

Sputum :

Chestpain :

Haemoptysis :

Wheeze :

Contact history of Tuberculosis : yes/no

PREVIOUS H/O ANTI TB MEDICATION[DETAILS];

EXAMINATION

GENERAL : Anaemia

Lymphadenopathy

Jaundice

Spine

Pedal edema

VITALS :

PR: BP:

RR: Temp:

RESPIRATORY SYSTEM :

Inspection :

Palpation :

Percussion :

Auscultation:

PER ABDOMEN :

CARDIOVASCULAR SYSTEM :

CENTRAL NERVOUS SYSTEM :

INVESTIGATIONS :

RBS :

UREA, CREATININE :

RBC COUNT :

PCV :

BT / CT :

PLEURAL FLUID ASPIRATION NOTES :

PLEURAL FLUID : SUGAR

PROTEIN

CELL COUNT

LDH

RBC COUNT

PCV

CYTOLOGY FOR [MALIGNANT CELLS]

MANTOUX :

SPUTUM for AFB:

CHEST X RAY:

CT- CHEST:

THORACOSOPIC FINDINGS

THORACOSCOPIC BIOPSY RESULTS-

OTHER INVESTIGATIONS:

FINAL DIAGNOSIS :

Annexure-2 **CONSENT FORM**

PATIENT NAME : ..... I.P. NO. : .....

CONSULTANT : ..... ROOM NO. : .....

AGE : ..... SEX : ..... DATE : .....

CONSENT FORM FOR PROCEDURE & SURGERIES

I hereby authorize Dr. _____ and / or associates to perform upon me or the above named patient the following operations and / or procedure _____

_____

on _____ under _____ anaesthesia.

I have been fully explained the nature and purpose of the operation / procedure by the doctor / his or her associate and he / she has also informed me of the expected benefits and complications, attendant discomforts and risks that may arise, as well as possible alternatives to the proposed treatment in the language that I understand. I have been given an opportunity to ask questions, and all my questions have been answered fully and satisfactorily.

I understand that during the course of the operation or procedure unforeseen coditions may arise which require procedures different from those planned. I therefore consent to the performance of additional / alternative procedures which the above named surgeon or his / her associates may consider necessary.

I further consent to the administration of such anesthetics as may be considered necessary. I recognize that there are occasional risks to life and health associated with anesthesia and such risks have been fully explained to me.

The need for ICU care and venitalory support in the post operative period, should the need arise has also been impressed upon me and I give consent for the same.

I give my consent for blood and / or blood products if I / the mentioned patient need them. I know the laboratory screens my blood for infections and diseases like hepatitis and HIV.

For the purposes of advancing medical knowledge and education, I consent to the photographing, videotaping or televising the operation or procedure to be performed, provided my/the patient's identity is not disclosed.

I confirm that I have understood the above and I give my voluntary consent to perform the surgery / procedure on me / the above named patient.

Surgeon's Signature

Patient's Signature / Left hand thumb impression

Witness Signature

Patient's Relative / Guardian's Signature

Date and Time

Relationship

Annexure-3- **<u>Consent form in tamil</u>**

அறிவார்ந்த ஒப்புதல் படிவம்

பெயர் : வயது : ஆண் / பெண் :

உள் நோயாளி எண் :

எனக்கு நோய் கண்டறியும் "தொராக்கோஸ்கோப்பி" என்னும் அறுவைசிகிச்சையின் தன்மையையும், அவசியத்தையும் மருத்துவர் மூலம் தெளிவாக எடுத்துரைக்கப்பட்டது. இந்த சிகிச்சையில் பயன்கள் மற்றும் பின்விளைவுகள் பற்றியும், இச்சிகிச்சையினால் மூச்சு விடுவதில் சிரமம் ஏற்படலாம் என்றும் உயிருக்கே ஆபத்து ஏற்படலாம் என்றும் மருத்துவர் மூலம் அறிந்து கொண்டேன்.

இந்த சிகிச்சையின் போது எனக்கு ஏதேனும் இருக்க மயக்க மருந்து கொடுக்கப்படும் என்றும், அந்த பின்விளைவால் மூச்சு விடுவதில் சிரமம் ஏற்படலாம் என்றும் ; அப்படியானால் அதற்கு மாற்று சிகிச்சை தேவைப்படும் பொழுது ; அச்சிகிச்சையையும் நான் மேற்கொள்வதற்கு என் முழு சம்மதத்தையும் அளிக்கிறேன்.

இந்த சிகிச்சையின் போது இரத்தம் / நீர் / சீழ் / மற்றும் இதர சாரிசோதனைகளைச் செய்ய சம்மதம் அளிக்கிறேன்.

இச்சிகிச்சையின் போது எனது நெஞ்சில் தேவைப்பட்டால் ஐ.சி.டி குழாய் போடுவதற்கும் முழு சம்மதம் அளிக்கிறேன்.

— தொழுநோய் நோய்பற்றி எனக்கு இந்த நோய் கண்டறியும் முறை எனது நோயின் தன்மையை அறியவும் , தகுந்த சிகிச்சை அளிப்பதற்கும் மிக அவசியம் என மருத்துவர் மூலம் தெரிந்து கொண்டேன் . அதனால் இந்த சிகிச்சையை நான் மேற்கொள்ள முழு மனதுடன் சம்மதிக்கிறேன் .

— இந்த சிகிச்சையால் ஏற்படும் பின்விளைவுகளை மருத்துவரிடம் , மருத்துவமனையில் சொல்லப்பட்டது என்பதையும் அறிவேன் .

— இந்த சிகிச்சை முறையின் அடிப்படையில் சில ஆய்வுகள் நடத்தப்படுவதாகவும் , இந்த ஆய்விற்காக என்னையும் எனது நோய் பற்றிய தகவல்களை பயன்படுத்தப்படும் என்று அறிவேன் . இதற்கு முழு மனதுடன் சம்மதிக்கிறேன்

— இந்த ஆய்வின்போது , நான் மேற்கொள்ளும் சிகிச்சை முறை படமாக்கப்படலாம் என்று அறிவேன் . இதற்கு முழு மனதுடன் சம்மதிக்கிறேன் .

மேற்கூறிய அனைத்தையும் நான் நன்கு
புரிந்து-கொண்டேன். இந்த சிகிச்சையை மேற்கொள்ள
எனது சுயஒப்புதலை முழு மனதுடன் அளிக்கிறேன்.

நோயாளியின் கையொப்பம் /

மருத்துவர்
கையொப்பம்

சாட்சி 1:

நோயாளியின் உறவினர்

நாள் :

நேரம் :

Annexure-4 **Ethical committee approval letter**

STANLEY MEDICAL COLLEGE, CHENNAI-1

Title of the Work : The value of medical Thoracoscopy done at the Government Hospital of Thoracic Medicine, Tambaram Sanatorium in cases of Hemorrhagic pleural Effusions.

Principal Investigator : Dr. C.Chellaraja

Designation : MD (Pulmonary Medicine)Post Graduate
: Department of Thoracic Medicine
Government Stanley Medical College,
Chennai-1

The request for an approval from the Institutional Ethical Committee (IEC) was considered on the IEC meeting held on 04.02.2011 at the Modernized Seminar Hall, Stanley Medical College, Chennai-1 at 2PM

The members of the Committee, the secretary and the Chairman are pleased to approve the proposed work mentioned above, submitted by the principal investigator.

The Principal investigator and their team are directed to adhere to the guidelines given below:

1. You should inform the IEC in case of changes in study procedure, site investigator investigation or guide or any other changes.
2. You should not deviate form the area of the work for which you applied for ethical clearance.
3. You should inform the IEC immediately, in case of any adverse events or serious adverse reaction.
4. You should abide to the rules and regulation of the institution(s).
5. You should complete the work within the specified period and if any extension of time is required, you should apply for permission again and do the work.
6. You should submit the summary of the work to the ethical committee on completion of the work.

MEMBER SECRETARY
IEC, SMC, CHENNAI

Dr. S. MADHAVAN, M.D.,
Professor and Head
Dept. of Pharmacology
Stanley Medical College,
Chennai - 600 001

Annexure – 5 **IRB approval letter**

Govt. Hospital of Thoracic Medicine
Tambaram Sanatorium Chennai-47, Tamilnadu, India
Phone : (91-044-22418450/22418427)
Fax : (91-044-22418668)

Dr. O. R. Krishnarajasekhar, MD DTRD.,
Deputy Superintendent and Member Secretary,
Institutional Review Board,
GHTM.

To

Dr. C. Chellaraja,
Post-graduate MD.(Pulm. Med.),
Stanley Medical College

Dear Sir,

The research project "The Diagnostic value of Medical Thoracoscopy done at Government Hospital of Thoracic Medicine, Tambaram Sanatorium in cases of hemorrhagic pleural effusions" has been approved by the Institutional Review Board Committee held on 28th April 2011 at Conference Hall, GHTM.

With warm regards,

22/6/11

Dr. O. R. Krishnarajasekhar
Member Secretary

Place : Chennai
Date : 22nd June 2011

Annexure-6 Letter of safety submitted to ethical committee

FROM,

DR.C.CHANDRASEKAR.M.D.DTCD.

PROFESSOR & HEAD , DEPARTMENT OF THORACIC MEDICINE,STANLEY MEDICAL COLLEGE,

& SUPERINTENDENT, GOVERNMENT HOSPITAL OF THORACIC MEDICINE,

TAMBARAM SANATORIUM, CHENNAI-47.

TO,

THE DEAN,

STANLEY MEDICAL COLLEGE,

CHENNAI .

RESPECTED MADAM :

sub : - letter of safety regarding medical thoracoscopy done at Govt Hospital of thoracic medicine, Tambaram sanatorium- reg

Herewith I wish to inform you that `medical thoracoscopy` is being performed since January 2009 routinely at the government hospital of thoracic medicine, Tambaram sanatorium which is attached to stanley medical college , chennai . It is a very safe interventional procedure , regularly done ,with around 210 patients having undergone the procedure & nil mortality till date. I would also like to inform you that Dr.C.Chellaraja M.D [post graduate in pulmonary medicine] is doing a study regarding ` the value of medical thoracoscopy done at government hospital of thoracic medicine, Tambaram sanatorium, in cases of hemorrhagic pleural effusions`, & since medical thoracoscopy is a routine procedure being done here, patients are not subjected to this procedure for his study purpose alone.

thanking you

place Chennai

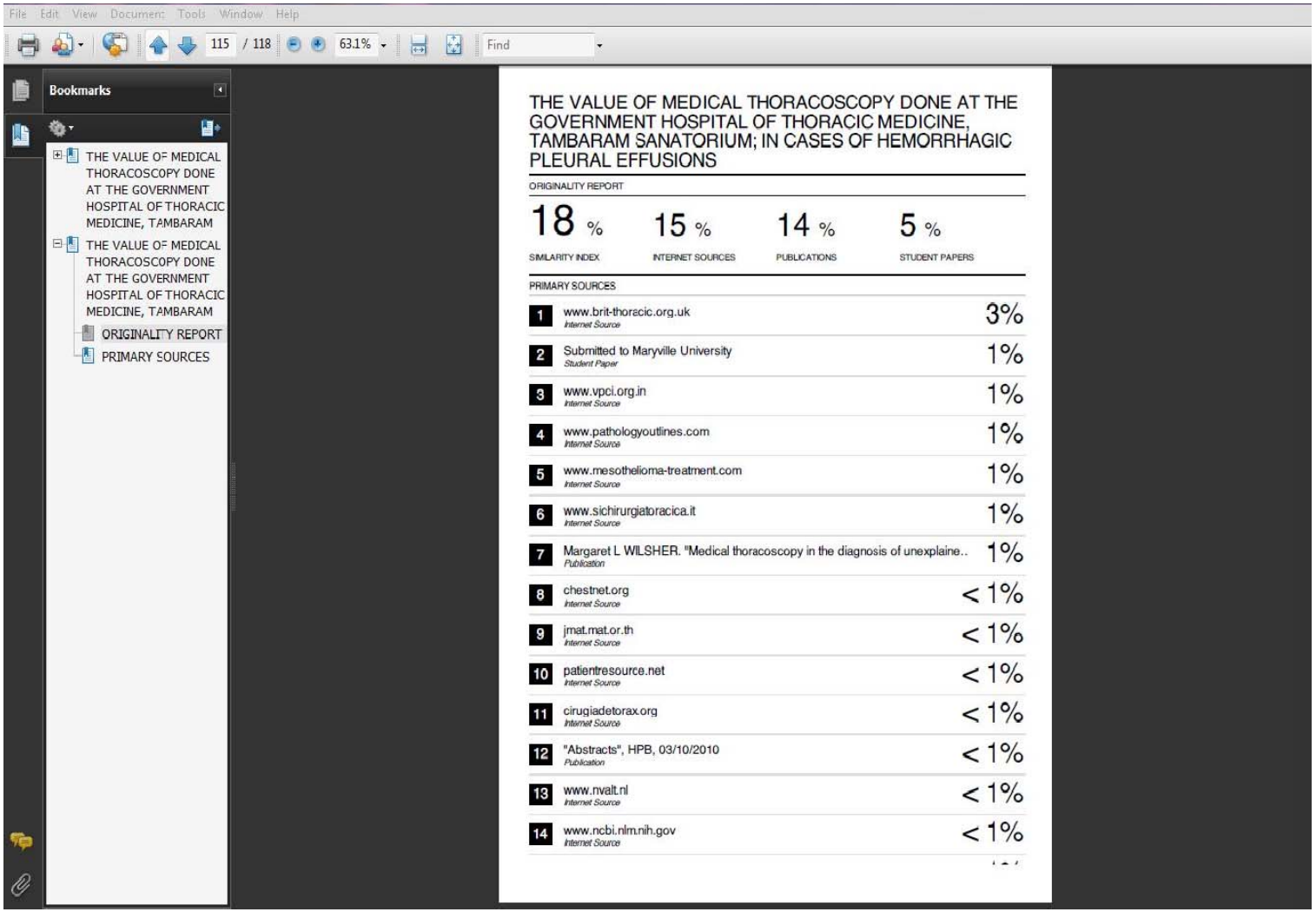
date 08/02/2011

yours faithfully

Dr. C. CHANDRASEKAR M.D.(CHEST), DTCD
(Superintendent) HOD
DEPARTMENT OF PULMONARY MEDICINE,
GOVT. STANLEY MEDICAL COLLEGE AND HOSPITAL,
CHENNAI - 600 001

Prof. Dr. S. DEIVANAYAGAM, M.S.
Prof & HOD,
Dept. of Gen. Surgery,
Govt. Stanley Medical College & Hospital
Chennai - 600 001
8/2/11

Dr. S. MADHAVAN M.D.
Professor and Head
Dept. of pharmacology
Stanley Medical College
Chennai-600 001
8/2/11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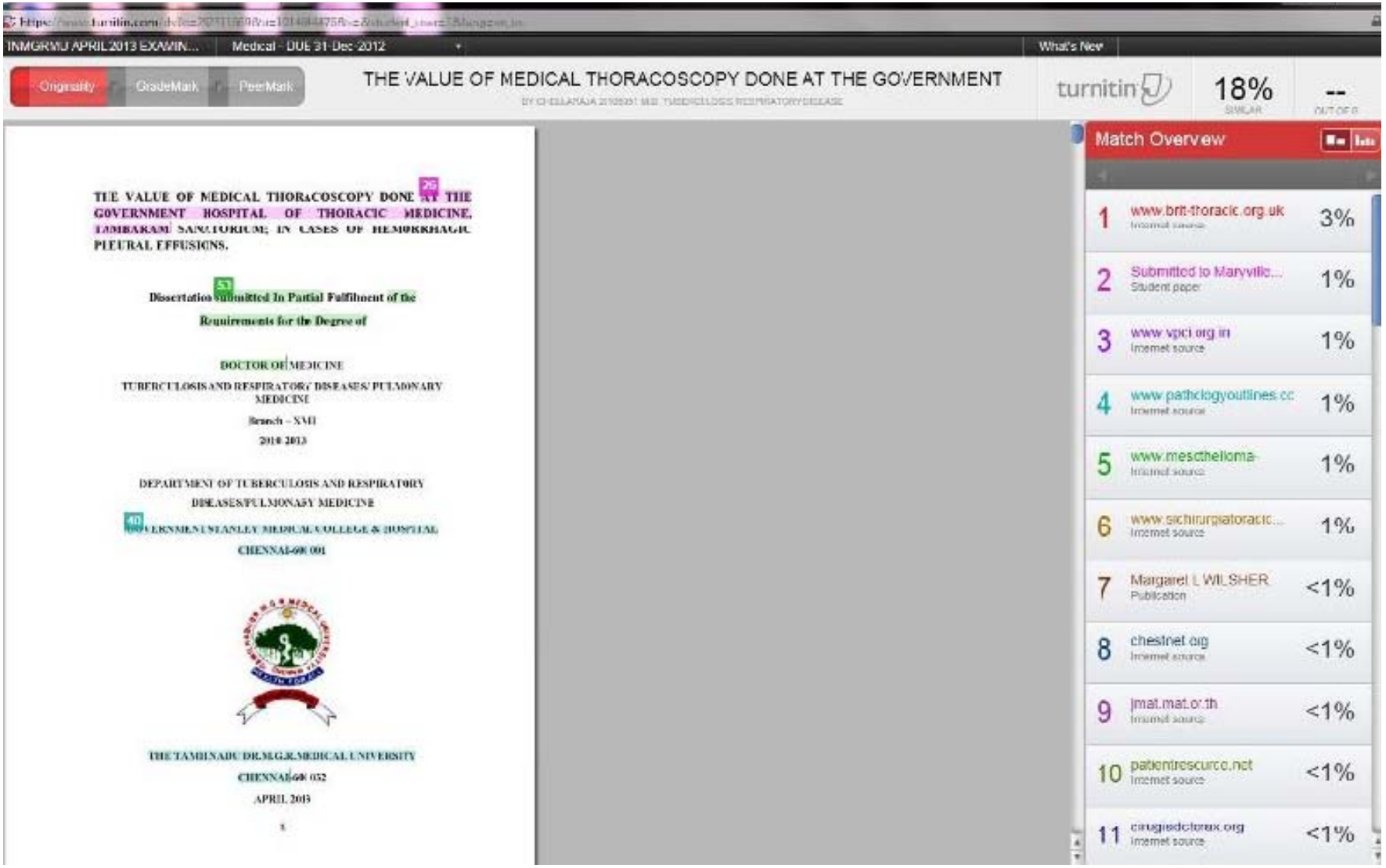
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